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**INTERNATIONAL CRITICAL TABLES
OF
NUMERICAL DATA
PHYSICS, CHEMISTRY AND TECHNOLOGY**

INTERNATIONAL CRITICAL TABLES OF NUMERICAL DATA, PHYSICS, CHEMISTRY AND TECHNOLOGY

Prepared under the Auspices of the International
Research Council and the National
Academy of Sciences

BY THE
NATIONAL RESEARCH COUNCIL
OF THE
UNITED STATES OF AMERICA

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PREFACE BY THE BOARD OF TRUSTEES

The publication of International Critical Tables at a price that would make possible a world-wide distribution required that the undertaking be financed by those appreciating its importance and in a position to make the necessary investment. Some 244 firms and individuals and two of the larger Foundations have provided the sum of \$170,000 required for the compilation.

Many individuals have given freely of their time and effort in helping to obtain the funds necessary for the compilation of this work. In addition to those who have been responsible for assigned territory, there are a large number of others in industrial organizations which have supported the enterprise, and grateful acknowledgment is made of their interest and help, quite as much as if it were possible to give here the complete list of names. Indeed, it is impossible for the trustees to know of all those who at different stages of the work have rendered valuable assistance.

Special acknowledgment is due to the Carnegie Corporation of New York and to the International Education Board, whose appropriations in the support of this work were a large factor in making its successful completion possible.

It is appropriate to give here special recognition to those who assumed and carried out definite responsibility in the solicitation of funds, as well as to those whose financial support enabled the project to be made a reality.

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The work of the trustees began with the appointment of Hugh K. Moore in 1920, with whom were later associated Julius Stieglitz, representing the American Chemical Society, and E. P. Hyde, representing the American Physical Society. After a substantial sum had been procured, the number was enlarged to include H. E. Howe and later George P. Adamson and Charles L. Reese. Mr. Hyde resigned to go abroad and was succeeded by Frank B. Jewett, who has lately been succeeded by Michael Pupin as representative of the American Physical Society. Upon relinquishing his active duties in the National Research Council, H. E. Howe was succeeded as Secretary of the Board of Trustees by W. M. Corse, but remained a member of the Board; and a little later Edward B. Craft was added to the Board.

The trustees have been obliged to place a maximum limit on the cost of this work, but they realize that other material which could not be included because of financial limitations should be made available and that International Critical Tables, if it is to render maximum service, should become an established institution, with supplements and revisions published from time to time, in order that these fundamental data may be made available as rapidly as the values are established through further research. An endowment therefore should be sought for International Critical Tables, and with the appearance of the completed set it is believed the enterprise will appeal to many of those able to make such an endowment a reality.

The trustees wish to express their gratitude to the many industrialists who have given of their time to become acquainted with this enterprise, for the courtesy which they have everywhere met, and for the widespread cooperation without which International Critical Tables could not have been brought into existence.

George P. Adamson
 William M. Corse
 Edward B. Craft
 Harrison E. Howe

Hugh K. Moore
 Michael I. Pupin
 Charles L. Reese
 Julius Stieglitz

PREFACE BY THE BOARD OF EDITORS

At the organization meeting of the International Union of Pure and Applied Chemistry, held in London in June 1919, the Union approved as one of its projects the compilation of International Critical Tables of Numerical Data of Physics, Chemistry, and Technology, and assigned to the United States of America the financial and editorial responsibility for the undertaking. The project was later given the patronage of the International Research Council at its Brussels meeting in 1923.

On behalf of the National Academy of Sciences, the National Research Council of the United States accepted the executive, editorial and financial responsibilities of the project, and with the cooperation of the American Chemical Society and the American Physical Society, created a Board of Trustees to take charge of the financial and business administration, and a Board of Editors to supervise and carry out the preparation of the text.

The first action of the Board of Editors, early in 1922, was to approve the appointment of Corresponding Editors in different parts of the world, particularly in all those countries in which conditions were such that they might be expected to take a really active part in the undertaking. In making these appointments, the Board first sought the advice of competent individuals in the several countries, and in accordance with the suggestions thus received, appointed ten Corresponding Editors and empowered them to arrange for Advisory Committees to assist in the work. In the case of certain countries, the Board was unsuccessful in its efforts to secure cooperation, usually either because of the receipt of no reply or an unfavorable reply, or through failure of the Corresponding Editor, after appointment, to perform his duties.

The general plan of preparation of the Tables was as follows: The subject matter was first divided into some 300 different sections. The Corresponding Editors were then asked to recommend for the several sections one or more persons who should either have some special knowledge of the subject matter of the section, or be otherwise qualified to pass critical judgment upon the available information on the subject. On the basis of the recommendations thus received, the Board of Editors selected the Cooperating Experts, to whom was intrusted the task of critically compiling, and displaying in suitable form, the available quantitative information upon the several topics. In making these selections, the Board consistently endeavored to secure the best man *available* in the light of all the information which it possessed. In certain special fields composed of closely related topics, the Board provided also for the appointment of Special Editors to supervise the work and to assist in the final arrangement of the material.

In the course of its labors the Board of Editors has enjoyed the cooperation of numerous organizations and individuals whose advice, suggestions, and assistance, in many ways have greatly aided it in its complex and difficult task. It is especially indebted to the several Corresponding Editors and their Advisory Committees, who have generously contributed their time and thought to the success of the work; to the Special Editors; to the U. S. Bureau of Standards, the National Physical Laboratory of Great Britain and the Physical Society of France; to the International Commission in charge of Annual Tables; and to various organizations and individuals who made available unpublished data for the use of the Cooperating Experts.

PREFACE PAR LE COMITÉ DES RÉDACTEURS

Lors de l'Assemblée d'organisation de l'Union internationale de Chimie pure et appliquée, qui eut lieu à Londres en Juin 1919, l'Union approuva comme l'un de ses projets l'élaboration de Tables critiques de valeurs numériques de physique, chimie et technologie, et elle chargea les Etats-Unis d'Amérique de la responsabilité financière et d'édition de l'entreprise. Le projet fut, plus tard, placé sous le patronage du Conseil international de Recherches, à son assemblée de Bruxelles en 1923.

Chargé de ces attributions, le Conseil national de Recherches des Etats-Unis, agissant en collaboration avec la Société chimique américaine et la Société physique américaine, nomma un Conseil d'Administration et un Comité des Rédacteurs.

La première activité que manifesta le Comité des Rédacteurs, au début de 1922, fut d'approuver la nomination de Rédacteurs-correspondants dans les différentes parties du monde, particulièrement dans tous les pays dont les conditions autorisaient l'espoir d'une collaboration active dans cette entreprise. Pour procéder à ces nominations, le Comité sollicita d'abord l'avis de personnalités compétentes dans les divers pays, et c'est en tenant compte des suggestions ainsi obtenues qu'il nomma dix Rédacteurs-correspondants et leur donna les pouvoirs nécessaires pour organiser des Comités-consultatifs dans le but d'aider à l'accomplissement du travail. Dans le cas de certains pays, les efforts du Comité en vue de s'assurer leur coopération furent vains, soit qu'il n'y eût pas de réponse ou que celle-ci fut défavorable, soit encore que le Rédacteur-correspondant, après sa nomination, eût manqué à ses engagements.

Le plan général de préparation de ces Tables fut le suivant: l'ensemble des matières à traiter fut d'abord divisé en quelque 300 différentes sections. Les Rédacteurs-correspondants furent alors priés de recommander, pour les différentes sections, une ou plusieurs personnes qui eussent des connaissances spéciales du sujet traité dans la section ou qui fussent qualifiées pour formuler un jugement critique sur les informations à disposition concernant le sujet. Sur la base des recommandations ainsi reçues, le Comité des Rédacteurs choisit les Experts-coopérants qui furent chargés de la compilation critique et de la disposition sous une forme convenable des informations quantitatives disponibles sur les différents sujets. En faisant cette sélection, le Comité s'efforça de s'assurer la collaboration de la personne qui, d'après les renseignements recueillis, était la plus qualifiée et qui se trouvait alors disponible. Dans certains domaines spéciaux, composés de sujets étroitement apparentés, le Comité se chargea aussi de nommer des rédacteurs spéciaux pour diriger le travail et pour aider à l'arrangement final de la matière.

Au cours de ses travaux, le Comité des Rédacteurs a eu le plaisir d'enregistrer la coopération de nombreuses organisations et de particuliers dont les conseils, les suggestions et l'aide lui ont été, en maintes circonstances, d'un grand secours dans l'accomplissement de sa tâche complexe et difficile. Il est spécialement reconnaissant aux nombreux Rédacteurs-correspondants et à leurs Comités-consultatifs qui ont généreusement donné leur temps et leur pensée pour assurer le succès de l'oeuvre; aux Rédacteurs spéciaux, au U. S. Bureau of Standards, au National Physical Laboratory of Great Britain et à la Société de Physique de France; à la Commission internationale chargée des Tables annuelles; ainsi qu'aux

VORWORT DER REDAKTIONS-KOMMISSION

An der geschäftlichen Sitzung der Internationalen Union für reine und angewandte Chemie in London, Juni 1919 billigte die Union, als eine ihrer Aufgaben, die Abfassung Internationaler kritischer Tafeln, numerischer Daten der Physik, Chemie und Technologie und betraute die Vereinigten Staaten von Amerika sowohl mit dem finanziellen als auch mit dem redaktionellen Teil dieser Aufgabe. Der Plan erhielt später die Förderung durch International Research Council an der Tagung in Brüssel 1923.

Entsprechend dieser Betraung errichtete National Research Council der Vereinigten Staaten, zusammenwirkend mit American Chemical Society und American Physical Society vorgehend, eine geschäfts-führende Kommission und eine Redaktions-Kommission.

Die ersten Schritte, welche die Redaktions-Kommission zu Beginn des Jahres 1922 machte, war, sich korrespondierende Mitglieder in allen Teilen der Welt zu sichern, besonders in denjenigen in welchen die Bedingungen vorhanden waren, die eine lebhafte Beteiligung an dem Unternehmen erwarten liessen. Nach diesem nahm die Kommission zuerst den Rat massgebender Persönlichkeiten verschiedener Länder entgegen; in Übereinstimmung mit den so erhaltenen Vorschlägen, wurden zehn korrespondierende Mitglieder bestimmt, welche nun einen beratenden Ausschuss zu bilden hatten, um der Arbeit ihre Unterstützung zu zuwenden. In einigen Ländern gelang es der Kommission nicht Mitarbeiter zu erlangen, meistens deshalb weil keine, oder eine ablehnende Gegenäusserung erfolgte, oder, dass das korrespondierende Mitglied, nach der entsprechenden Zusage nicht vorging.

Die Grundlinien für die Bearbeitung der Tafeln waren die folgenden. Das Material wurde zuerst in etwa dreihundert verschiedene Abschnitte zerlegt. Die korrespondierenden Mitglieder wurden dann gebeten, für einige dieser Abschnitte, einen oder mehrere Mitarbeiter zu empfehlen, die entweder besondere Kenntnisse über den Gegenstand des Abschnittes besitzen, oder imstande waren, kritisch, vorhandenes Material durchzugehen. Auf Grund der so erhaltenen Empfehlungen, wählte die Redaktionskommission die Mitarbeiter aus, die mit der Aufgabe betraut wurden, kritisch die numerischen Daten des betreffenden Gegenstandes durcharbeiten und in entsprechender Form darzustellen. Bei dieser Auswahl war die Kommission ganz besonders bestrebt, nach den vorhandenen Mitteilungen, den besten zur Verfügung stehenden Mitarbeiter zu erhalten. In gewissen nahe verwandten Gebieten war man darauf bedacht, besondere Redaktions-mitglieder zu erhalten, um die Arbeit hier zu überwachen und tätigen Anteil der Schlussredaktion des Materials zu nehmen.

Im Laufe ihrer Bestrebungen konnte sich die Redaktion-Kommission der Mitarbeit zahlreicher Vereinigungen und einzelner Personen erfreuen, deren Ratschläge, Winke und Beihilfe ihnen bei der verwickelten und schweren Aufgabe von grossem Nutzen waren. Die Redaktionskommission ist besonders Dank ihren verschiedenen korrespondierenden Mitgliedern und dem beratendem Ausschuss schuldig, die in grossmütiger Weise ihre Zeit und Arbeit dem Erfolg dieser Tafeln gewidmet haben, ferner auch den Mitgliedern, die die Arbeit an den besonderen Kapiteln übernahmen. Der Dank gebührt U. S. Bureau of Standards, National Physical Laboratory of Great Britain und Société de Physique de France, der Internationalen Kommission betraut mit der Herausgabe der Tables annuelles und den verschiedenen Ver-

PREFAZIONE DELL' UFFICIO DI REDAZIONE

Nella conferenza tenuta a Londra nel giugno 1919 per organizzare la Unione Internazionale della Chimica Pura ed Applicata venne, tra gli altri, formulato il progetto di compilare delle Tabelle Critiche Internazionali contenenti dati numerici di fisica, chimica e tecnologia, e venne affidata agli Stati Uniti la responsabilità finanziaria ed editoriale dell'impresa. Al progetto fu in seguito accordato il patronato del Consiglio Internazionale di Ricerche nella riunione del 1923 a Bruxelles.

In seguito all'incarico ricevuto, il Consiglio Nazionale di Ricerche degli Stati Uniti, d'accordo con la American Chemical Society e con la American Physical Society, nominò un Consiglio di Amministrazione ed un Ufficio Editoriale.

Come suo primo atto, l'Ufficio, nel 1922, nominò Redattori Corrispondenti in tutto il mondo, scegliendoli di preferenza nei Paesi dove poteva ritenersi che essi avrebbero preso parte attiva al lavoro. Le nomine furono fatte dopo aver sentito il parere di persone competenti. A questo modo furono scelti dieci Redattori Corrispondenti e ad essi venne data facoltà di nominare ciascuno un Comitato consultivo col compito di assisterli nel lavoro. In alcuni Paesi l'Ufficio non riuscì ad assicurarsi collaborazione di sorta, o perchè addirittura non gli fu possibile ottenere una risposta, o perchè la risposta fu negativa, o perchè il Redattore Corrispondente scelto, dopo essere stato nominato, mancò agli obblighi assunti.

Il piano generale di preparazione delle tabelle è stato il seguente. Si è divisa la materia in circa 300 capitoli differenti, e i Redattori Corrispondenti sono stati invitati a suggerire per ogni singolo capitolo il nome di una o più persone le quali o avessero una speciale competenza nell'argomento o potessero ritenersi capaci di vagliare criticamente tutto quello che si conosce al riguardo. In base alle proposte ricevute, l'Ufficio di Redazione scelse gli Esperti, e a questi affidò l'incarico di raccogliere, vagliare ed esporre in forma opportuna i dati quantitativi che si sono potuti riunire sui diversi argomenti.

Nel fare la scelta degli Esperti l'Ufficio cercò sempre di assicurarsi la collaborazione degli uomini che, in base alle informazioni avute, dovevano ritenersi i migliori di cui si potesse disporre. In certi campi speciali, comprendenti argomenti strettamente connessi, l'Ufficio nominò anche dei Redattori Speciali col compito di sorvegliare il lavoro e collaborare alla disposizione definitiva del materiale.

Nell'espletare il suo compito, l'Ufficio di Redazione ha potuto giovare della collaborazione di numerose organizzazioni e di numerose persone, le quali con consigli e suggerimenti vari sono state di grande aiuto nel portare a fine un lavoro che è stato certamente complesso e difficile. L'Ufficio è specialmente grato ai vari Redattori Corrispondenti e ai rispettivi Comitati Consultivi i quali hanno generosamente dato il loro tempo e la loro intelligenza al successo dell'opera, ai Redattori Speciali, al Bureau of Standards degli Stati Uniti, al National Physical Laboratory inglese e alla Société de Physique francese, alla Commissione Internazionale in carica per le Tabelle annuali e alle varie organizzazioni e persone che misero a disposizione degli Esperti dati inediti.

Infine i Membri dell'Ufficio desiderano manifestare l'alto apprezzamento che fanno dei contributi di tutti gli Esperti, il lavoro dei quali, compiuto in larga misura con entusiasmo e disinteressatamente, ha reso possibile queste tabelle; ed in particolar modo

Finally, the members of the Board desire to record their appreciation of the work of all of the Cooperating Experts whose contributions, largely a labor of love, have made these tables possible; and in particular, of the work of the Editorial Staff, Messrs. Washburn, Dorsey, and West, to whom indeed the utility of this collection of tables should be largely accredited.

George K. Burgess
Saul Dushman
John Johnston

S. C. Lind
C. E. Mendenhall
R. B. Moore.

organisations diverses et aux personnes qui ont procuré des données inédites à l'usage des Experts-coopérants.

Efin, les membres du Comité désirent exprimer leur appréciation pour le travail de tous les Experts-coopérants dont les contributions, pour une large part désintéressées, ont rendu possible l'élaboration de ces Tables, et en particulier pour le travail des Rédacteurs, MM. Washburn, Dorsey et West, auxquels nous sommes en grande partie redevables des services que rendra cette collection de Tables.

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INTRODUCTION

International Critical Tables is the result of the cooperative labors of a large number of specialists, each of whom has been charged with the responsibility for the critical compilation of the quantitative information available on his topic. The word "critical" in this connection means that the Cooperating Expert was requested to give in each instance the "best" value which he could derive from all the information available, together, where possible, with an indication of its probable reliability.

Through a cooperative arrangement with International Annual Tables, the Board of Editors has been able to place in the hands of each Cooperating Expert the literature references belonging to his topic for the years 1910-1923 inclusive, as compiled by the staff of International Annual Tables. For the period preceding 1910, each Cooperating Expert was directed to collect the necessary literature references from the various published handbooks, special treatises, works of reference, and other sources known to him as a specialist in the field. No attempt has been made to systematically cover the literature since 1923, although a certain amount of information published since then has been utilized.

In preparing the various sections, the Cooperating Experts were instructed,—

1. To include in the bibliography only (a) the sources of the data upon which their reported values actually rest, and (b) the sources of available data of the same kind pertaining to those systems for which no numerical value is given. It is not intended to be a complete bibliography of the field.

2. To omit from the tables of numerical data all those systems for which the available data (a) were of slight scientific or practical interest, or (b) were so discordant as to be of little, if any, value.

3. To set forth the results of their work in the form of text, equations, tables, graphs, or charts, as seemed most appropriate under the circumstances, having regard to the necessity of space economy.

4. To give only selected samples illustrating types in the case of very large and heterogeneous fields, such as colloids, chemical kinetics, and certain classes of industrial materials.

5. To restrict the accompanying explanatory text to the amount necessary for the intelligent use of the data. (Under this restriction, the Expert is given no opportunity to present a general discussion of his subject or of the methods by which he obtained the values given.)

In preparing the textual material for publication the Editors have been compelled, in the interest of economy of space, to enforce the restrictions imposed by sections 3 and 5 of the preceding paragraph and have freely rearranged and rewritten the text, whenever it was evident that a compression or an improvement in logical order could be so secured. With few exceptions, which are duly

INTRODUCTION

Les Tables critiques internationales sont le résultat du travail coopératif d'un grand nombre de spécialistes, chacun de ceux-ci ayant été chargé de la responsabilité de la compilation critique des informations disponibles sur son sujet. Le mot "critique" dans ce cas signifie que l'expert coopérant fut invité à donner dans chaque circonstance la "meilleure" valeur qu'il pouvait recueillir de toutes les informations disponibles, en ajoutant si possible une indication au sujet de la confiance probable qu'on pouvait avoir en elle.

Par le fait d'un arrangement coopératif avec les Tables annuelles internationales, le Comité des Rédacteurs a été en mesure de mettre à la disposition de chaque expert coopérant les références bibliographiques appartenant à son sujet de l'année 1910 à l'année 1923 inclusivement, celles-ci ayant été compilées par le Bureau des Tables annuelles internationales. Pour la période précédant 1910, chaque expert coopérant fut chargé de recueillir les références bibliographiques nécessaires en usant des manuels variés publiés, des traités spéciaux, des ouvrages de références, et d'autres sources connues de lui en sa qualité de spécialiste du sujet traité. En ce qui concerne la littérature depuis 1923, aucune tentative n'a été faite pour la couvrir d'une façon systématique; un certain nombre d'informations postérieures à 1923 ont cependant été utilisées.

Pour la préparation des différentes sections, il fut recommandé aux experts coopérants:

1. D'inclure dans la bibliographie seulement (a) les sources de valeurs sur lesquelles reposent actuellement leurs valeurs reportées, et (b) les sources des données de même nature appartenant aux systèmes pour lesquels aucune valeur numérique n'est donnée. Le but poursuivi n'est pas de constituer une bibliographie complète du sujet.

2. De ne pas introduire dans les tables de valeurs numériques tous les systèmes pour lesquels les valeurs disponibles (a) sont de peu d'intérêt scientifique ou pratique, ou (b) sont par trop discordantes pour être d'une valeur quelconque, si toutefois elles en présentent une.

3. De disposer les résultats de leur travail sous la forme d'un texte, d'équations, de tables, de graphiques ou de cartes, en employant le moyen qui leur parut le mieux approprié suivant les circonstances, en ayant en vue la nécessité d'économiser de la place.

4. De ne donner que des exemples choisis, illustrant les types, dans le cas d'un champ très vaste et hétérogène, tel que: les colloïdes, la cinétique chimique et certaines classes de matières industrielles.

5. De restreindre le texte explicatif accompagnant les données au strict nécessaire pour la compréhension de celles-ci. (Vu cette restriction, l'expert n'a donc pas l'occasion de présenter une discussion générale de son sujet et des méthodes par lesquelles il a obtenu les valeurs données).

einigungen und Freunden, die noch nicht veröffentlichten Daten den Mitarbeitern zur Verfügung stellten.

Schliesslich möchte die Redaktions-Kommission ihre Anerkennung den Mitarbeitern ausdrücken, deren Arbeitsfreudigkeit diese Tafeln möglich machten, im besondern aber auch der Mühewaltung des Redaktionsstabes der Herrn Washburn, Dorsey und West, denen man vorwiegend den Erfolg und die Nützlichkeit dieses Tabellenwerkes schulden muss.

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ricordano l'opera dei dirigenti dell'Ufficio di Redazione, Sigg. Washburn, Dorsey, e West ai quali soprattutto si deve essere grati per l'utilità che si avrà dalla presente raccolta di tabelle.

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EINLEITUNG

Die Internationalen kritischen Tafeln stellen die Ergebnisse des Zusammenwirkens einer grossen Zahl von Mitarbeitern mit besonderen Erfahrungen dar, die mit der Aufgabe betraut wurden, die erreichbaren Daten des entsprechenden Gebietes kritisch darzustellen. In dieser Verbindung bedeutet das Wort kritisch soviel, dass der Mitarbeiter gebeten wurde, in jedem einzelem Fall die "besten" Werte zu geben, die er auf Grund aller zur Verfügung stehenden Literaturstellen, ableiten konnte, zugleich ferner, wenn möglich, alle Angaben mit dem Grade ihrer Zuverlässigkeit zu vermerken.

Durch ein Übereinkommen mit der Redaktion der Tables annuelles konnte die Redaktionskommission jedem einzelem Mitarbeiter, über seinen Gegenstand die Literatur der Jahre 1910 bis einschliesslich 1923 soweit übergeben, als sie durch die Redaktion der Tables annuelles ausgearbeitet worden ist. Für die Zeit vor 1910 wurde ein jeder Mitarbeiter gebeten, die notwendigen Literaturstellen und Daten aus den verschiedenen vorhandenen Handbüchern Spezial- und Nachschlagewerken und anderen, ihm als besonderem Kenner auf diesem Gebiete erreichbaren Quellen, zu sammeln. Es ist nicht versucht worden, die Literatur seit 1923 noch systematisch darzustellen, obwohl ein gewisser Teil davon noch Berücksichtigung finden konnte.

Bei der Bearbeitung der verschiedenen Abschnitte erhielt der Mitarbeiter folgende Anweisungen:

1. Als Literatur sind (a) nur diejenigen Stellen anzugeben, auf Grund deren die angegebenen Werte besonders folgerten, (b) die Quellen, über denselben Gegenstand, die aber keine numerischen Daten enthalten, die Verwendung gefunden haben.
2. Es sind in den Zahlenangaben der Tafeln alle diejenigen Systeme wegzulassen, deren vorliegende Daten, (a) von geringem wissenschaftlichen und praktischen Werte sind, oder (b) die Daten sind so widersprechend, dass sie, wenn überhaupt, von geringem Werte sind.
3. Die Ergebnisse ihrer Arbeit sind in einer solchen Form darzustellen, dass durch den Text, die Gleichungen, Tabellen und Tafeln mit Rücksichtnahme auf Raumersparnis, der Zweck am besten erfüllt wird.
4. In sehr grossen, heterogenen Gebieten wie in denen der Kolloide, der chemischen Kinetik und in gewissen Fällen von technischer Bedeutung, sind nur ausgewählte Beispiele zu geben, die das Gebiet charakterisieren sollen.
5. Der erläuternde Text ist soweit zu beschränken, dass eine sachgemässe Verwertung der Tafeln noch möglich ist. (Bei dieser Einschränkung hat der Experte nicht die Gelegenheit allgemein seine Aufgabe, noch die Methode, darzustellen, nach welchen er seine Angaben erhalten hat.)

INTRODUZIONE

Le Tabelle Critiche internazionali sono il frutto della collaborazione di un gran numero di specialisti a ciascuno dei quali è stato affidato il compito di vagliare i dati disponibili sopra un determinato soggetto. La denominazione di tabelle "critiche" indica che l'esperto è stato incaricato di dare in ogni caso il valore "migliore," deducibile da tutte le notizie che si hanno a disposizione. Tutte le volte che è stato possibile l'esperto è stato incaricato anche di dare indicazioni sul grado di attendibilità dei valori numerici.

In seguito ad accordi intervenuti con le Tabelle annuali internazionali, l'ufficio di Redazione ha potuto fornire a ciascun esperto le indicazioni bibliografiche riferentisi agli anni dal 1910 al 1923 incluso, quali vengono compilate dalla direzione delle Tabelle internazionali. Per gli anni precedenti al 1910, gli esperti vennero consigliati a raccogliere la letteratura dai vari manuali, trattati speciali, lavori bibliografici e da altre fonti ad essi note data la qualità di ognuno di specialista in un determinato campo. Dei dati pubblicati dopo il 1923 si è tenuto conto solo in parte.

E' stato raccomandato agli esperti che, nel preparare le varie parti:

1. Includessero nella Bibliografia soltanto: (a) le fonti delle indicazioni sulle quali sono basati i valori riportati, e (b) le fonti delle indicazioni riguardanti i sistemi per i quali non viene dato nessun valore. Non si è riportato inteso una bibliografia completa del soggetto.
 2. Omettessero nelle tabelle delle grandezze numeriche tutti quei sistemi per i quali i dati disponibili; (a) fossero di poco interesse scientifico o pratico, oppure (b) fossero così in disaccordo da essere di poco o di nessun valore.
 3. Esponessero, a seconda dei casi, i risultati del loro lavoro in forma di testo, di equazioni, di tabelle, di grafici, o di tavole tenendo presente la necessità di economia di spazio.
 4. Riportassero soltanto esempi tipici nei campi molto vasti ed eterogenei come colloidi, cinetica chimica ed alcune classi di prodotti industriali.
 5. Limitassero il testo esplicativo a quel tanto sufficiente per un uso intelligente delle tabelle (data questa limitazione, all'esperto non è stato consentito di redigere una esposizione generale del suo soggetto o dei metodi con i quali egli ha ottenuto i valori che riporta).
- Nel preparare il testo per la pubblicazione i Redattori sono stati obbligati, per economia di spazio, ad applicare le restrizioni imposte nei capoversi 3 e 5 del precedente paragrafo, ed hanno liberamente cambiato disposizione e forma al testo, ogni qualvolta era evidente che potesse derivarne un miglioramento. Salvo poche eccezioni, tutte indicate la forma definitiva del testo è stata sottoposta alla approvazione dell'Esperto.

noted, the final form of the rewritten text was submitted to the Expert and was accepted by him.

In preparing the numerical data for publication the Editors have made no change except in their arrangement and in their mode of presentation. In making such changes the Editors have been guided by the necessity of saving space. The numerical data are in all cases those submitted by the Expert, excepting that (a) a few additional values, all duly indicated, have been inserted, and (b) when an Expert has submitted a number of values for the same nominal quantity, these have been grouped so as to make a single entry with an indication of the range covered by the values submitted, whenever such grouping seemed justifiable. In these cases, the final manner of grouping was in every case where possible submitted to and accepted by the Expert. The exceptional cases are noted as they occur.

Owing to the method of publication, *i.e.*, one volume at a time, a strictly logical arrangement of subject matter is not always followed. Among such a large number of Cooperating Experts a few instances of greatly delayed reports, arising from illness, accident, or other unforeseen causes, are to be expected; and certain sections or parts of sections, therefore, may not appear in their logical places but will be found in a later volume. The whole set of volumes is very completely indexed, however, and the user who consults the index should have no difficulty in locating any information given.

Chemical compounds are arranged in the tables by formula according to a definite system, called the "Standard Arrangement." This system is based upon a set of key numbers for the chemical elements and is fully explained in Volume One.

In order to find a given substance in the longer tables it is therefore necessary to know its chemical formula, at least approximately. If only the name is known, the formula, for most organic compounds or minerals, may be found with the aid of the name indices in Volume One, p. 174 and 280.

Pour la préparation du texte destiné à la publication, les rédacteurs se sont vu obligés, afin d'économiser encore de la place, d'accentuer encore les restrictions imposées dans les sections 3 et 5 du paragraphe précédent et ils ont pris la liberté de ré-arranger et de ré-écrire le texte partout où il était évident qu'une compression ou une amélioration dans l'ordre logique pouvait ainsi être réalisée. A part de rares exceptions, qui sont du reste dûment notées, la forme définitive du texte ré-écrit fut soumise à l'expert et acceptée par lui.

En disposant les données numériques pour la publication, les rédacteurs n'ont fait aucune modification, excepté en ce qui concerne l'arrangement et le mode de présentation. En faisant ces changements, les rédacteurs ont été guidés par la nécessité d'épargner de la place.

Les données numériques sont dans tous les cas celles fournies par les experts, à l'exception (a) d'un petit nombre de valeurs, toutes dûment indiquées, qui ont été insérées, et (b) lorsqu'un expert a soumis un certain nombre de valeurs pour la même quantité nominale, ces valeurs ont été groupées de façon à constituer une entrée unique, avec une indication du range occupé par les valeurs fournies, toutes les fois qu'un tel groupement paraissait indiqué. Dans ces cas, la forme définitive du groupement fut, partout où cela était possible, soumise à l'expert et acceptée par lui. Les cas exceptionnels sont notés lorsqu'ils se présentent.

Étant donné le mode de publication par un volume à la fois, un arrangement strictement logique de la matière traitée n'est pas toujours possible. En effet, avec un tel nombre d'experts co-opérants, il faut s'attendre à ce qu'il y ait quelques circonstances imprévues, telles que maladies, accidents ou autres causes, occasionnant un grand retard dans la remise des rapports; c'est pourquoi certaines sections ou parties de sections ne peuvent paraître à leur place logique mais se trouveront dans un volume suivant. Cependant, la série complète des volumes étant indexée d'une façon très détaillée, le lecteur qui consulte la table des matières n'aura aucune difficulté pour repérer toute information donnée.

Les composés chimiques sont disposés dans les tables suivant leurs formules et cela d'après un système défini appelé "arrangement type." Ce système est basé sur une suite de "nombres clés" pour les éléments chimiques, et il est expliqué d'une façon complète dans le volume I.

Afin de trouver une substance donnée dans les longues tables, il est nécessaire de connaître sa formule chimique au moins approximativement. Si le nom seul est connu, la formule peut être trouvée pour la plupart des composés organiques ou des minéraux au moyen des noms indices qui se trouvent dans le volume I, p. 174 et 280.

Bei der Zusammenstellung des Textes für die Veröffentlichung waren die Herausgeber gezwungen, im Interesse der Raumerparnis die unter 3 und 5 oben angegebenen Richtliniein besonders zu betonen. Sobald erkannt wurde, dass eine Zusammenziehung und eine Verbesserung in der logische Anordnung möglich sei, wurde der Text frei zusammengestellt und frisch geschrieben. Mit wenigen Ausnahmen, welche besonders bezeichnet sind, wurde die entgültige Form des neu geschriebenen Textes dem Experten vorgelegt und von ihm angenommen.

Bei der Vorbereitung des Zahlenmaterials für die Veröffentlichung änderten die Herausgeber nichts, ausgenommen war nur dessen Anordnung und die Form der Darstellung, wobei man sich von der Notwendigkeit, Raum zu sparen, leiten liess. Die Zahlenwerte sind in allen Fällen dieselben, welche vom Experten vorlagen, ausgenommen, (a) dass einige ergänzende, besonders bezeichnete Werte hinzugefügt wurden und (b), wenn der Experte für dieselbe quantitative Grösse mehrere Werte angegeben hat. Diese wurden dann, sobald ein solches Vorgehen gerechtfertigt war, zusammengestellt, so, dass nur eine Zahl, mit den Grenzen hingeschrieben werden konnte, welche durch die Werte gegeben sind. In so einem Falle wurde die Endform der Anordnung jedesmal dem Experten, wo möglich vorgelegt und von ihm angenommen. Die Ausnahmefälle sind dorten wo sie vorgekommen bezeichnet.

Entsprechend der Publikationsmethode, der Herausgabe eines Bandes zu einer bestimmten möglichen Zeit, konnte eine genaue logische Anordnung eines bestimmten Kapitels nicht immer erreicht werden. Unter einer so grossen Zahl von Mitarbeitern sind Fälle zu erwarten, wo sich einige Artikel stark verzögern werden, sei es durch Krankheit oder andere unvorhergesehene Ursachen. Deshalb werden gewisse Abschnitte oder deren Teile nicht an ihren richtigen Plätzen erscheinen, sondern sie können in einem späteren Band gefunden werden. Die ganze Bänderfolge ist mit einem sehr vollständigem Verzeichnis versehen und der Leser, welcher das Verzeichnis benützt, wird keine Schwierigkeit haben, Vorhandenes aufzufinden.

Die chemischen Verbindungen sind in den Tafeln nach einem Formelsystem angeordnet, das als "Normalanordnung" (Standard Arrangement) bezeichnet wird. Dieses System, das im ersten Bande vollständig erklärt wird, beruht darauf, dass für die chemischen Elemente Schlüsselnummern gewählt werden.

Um im den längeren Tafeln eine gegebene Substanz aufzufinden, ist es notwendig, deren chemische Formel wenigstens annähernd zu kennen. Ist nur der Name bekannt, so kann die Formel der meisten organischen Verbindungen und der Minerale, mit Hilfe des englischen Namenverzeichnisses im Bande 1 Seite 174 und 280 gefunden werden.

Nell'allestire i dati numerici per la pubblicazione i Redattori hanno fatto cambiamenti solo nel modo di disporli e di presentarli. Nel fare questi cambiamenti i Redattori sono stati guidati dalla necessità di risparmiare spazio. I dati numerici sono in tutti i casi quelli forniti dall'Esperto; solo qualche volta sono stati aggiunti alcuni pochi valori, tutti bene indicati, e qualche altra, avendo l'Esperto riportato parecchi valori per una stessa grandezza, questi—allorchè è sembrato giustificato il farlo—sono stati raggruppati indicando un solo numero ed i limiti entro i quali oscillano i valori considerati. In questi casi, la disposizione finale fu sempre, quando possibile, sottoposta all'approvazione dell'Esperto. Tutte le volte che è stato fatto diversamente, lo si è indicato.

Siccome le tabelle vengono pubblicate un volume alla volta, non sempre la disposizione della materia è fatta in modo strettamente logico.

Dato il numero grande di Esperti, è da aspettarsi che qualche rapporto sarà presentato con grande ritardo a causa di malattie o di incidenti imprevedibili. Certe parti pericliò potranno comparire non nel posto che logicamente ad esse spetterebbe, ma in volumi posteriori. Tutti i volumi sono però muniti di indici accurati e il lettore, consultandoli, non avrà difficoltà a rintracciare una notizia qualunque.

I composti chimici sono disposti nelle tabelle in base alle formule seguendo un sistema chiamato "disposizione Standard." Questo sistema è fondato sopra una serie di numeri chiave assegnati agli elementi chimici ed è esaurientemente spiegato nel primo volume.

Per poter quindi trovare una data sostanza nelle tabelle più lunghe, è necessario conoscerne la formula chimica, almeno approssimativamente. Se si conosce solo il nome, la formula si può trovare (per la massima parte dei composti organici o minerali) con l'aiuto degli indici per nome contenuti nel 1° volume p. 174 e 280.

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INTERNATIONAL CRITICAL TABLES

NATIONAL AND LOCAL SYSTEMS OF WEIGHTS AND MEASURES

CHARLES-ÉDOUARD GUILLAUME AND CHARLES VOLET

Plan.—Section A: International Metric System; list of countries in which its use was compulsory on January 1, 1925; list of those in which its use was either legally optional or partially compulsory on same date.

Section B: Other modern systems; the more important units at present in use or in use before adoption of metric system.

Section C: Weights and measures of antiquity.

Style and Abbreviations.—Only the singular number of the names of the units are used; ten meters will appear as 10 meter. Units of area and of volume will be written in the form centimeter² (= cm²) and centimeter³ (= cm³), respectively.

ca.	Value given is only approximate.
ch.	Units have changed from time to time.
cm ²	Square centimeter = centimètre carré = Quadrat-zentimeter = centimetro quadrato.
current	Units, other than metric, which are now in use; some of the units included in this class are practically obsolete. (See Local.)
local	Units of local or native origin or derivation which are in use, but which are embraced neither by the metric system nor by that of the central government. Applies mainly to colonial possessions. (See Current.)
m ³	Cubic meter = mètre cube = Kubikmeter = metro cubico.
m.c.	International metric system compulsory since . . .
m.o.	International metric system legally optional since . . .
older	Units used before adoption of international metric system.
older =	The older units were those of . . .
provincial	Units vary from one province or city to another.
since . . . = . . .	Since . . . the units have been the same as those of . . .
v.	Vide = see.
var.	Units are variable, not rigidly defined.

A. INTERNATIONAL METRIC SYSTEM

The decimal metric system, established in France by the Loi du 7 Avril, 1795, and represented by standards deposited in the Archives de France, became international on May 20, 1875, by the action of the Convention Internationale du Mètre. The new standards, of platinum-iridium, constructed at that time and serving as the basis of the international system, were copied from those of the Archives.

On January 1, 1925, the metric system was compulsory in:

Algeria	Greece	Peru
Allemagne	Guam	Poland
Argentina	Guatemala	Porto Rico
Austria	Haiti	Portugal and colonies
Autriche	Holland	Rumania
Belgium	Honduras	Russia
Bolivia	Hungary	Salvador
Brasil	Iceland	Schweden
Bulgaria	Italy & colonies	Schweiz
Chile	Japan	Serbie-Croatie-Slovénie
Colombia	Kolumbien	Seychelles Islands
Congo, Belgian	Kongo, Belgisch	Siam
Costa Rica	Kuba	Spain
Cuba	Luxemburg	Suède
Czechoslovakia	Malta	Suisse
Denmark	Mauritius	Svésia
Deutschland	Mexico	Svizzera
Ecuador	Netherlands & colonies	Sweden
Equateur	Nicaragua	Switzerland
Espagne	Norway	Tchécoslovaquie
Filippine	Olanda	Tunis
Finland	Österreich	Ungarn
France	Panama	Ungheria
Germany	Pay-Bas & colonies	Uruguay
Giöppöne	Philippine Islands	Venezuela
		Yugoslavia

On the same date, it was legally optional or partially compulsory in:

Canada	Great Britain	Irish Free State
China	India, British	Paraguay
Egypt	Ireland, Northern	Turkey
Ethiopia		United States of America

The fundamental units are: METER (m), which is the distance at 0°C between the axes of two lines ruled on the prototype deposited at the Bureau international des Poids et Mesures, Sèvres, France; KILOGRAM (kg), which is the mass of the prototype deposited at the same Bureau; and LITER (l), which is the volume of one kilogram of pure water at the temperature of its maximum density, under the pressure of one normal atmosphere.¹

The primary units of the system are the meter (m), micron (μ) = 10⁻⁶ meter, gram (g) = 10⁻³ kilogram, liter (l), are (a) = area of a square with a side 10 meter long, and stère (s) = volume of a cube with an edge one meter long. The units of area [of volume], characterized by the adjective square [cubic], are not derived from a primary unit, but are each defined as the area [volume] of a square [cube] with side [edge] equal to the stated unit of length. The names of other secondary units are formed by attaching to the name of a primary unit certain prefixes of unvarying significance.

¹ Normal atmosphere, v. p. 18.

Secondary units.

LENGTH m = meter		
μ	micron*	$= 10^{-6}$ m
mm	millimeter	$= 10^{-3}$ m
cm	centimeter	$= 10^{-2}$ m
dm	decimeter	$= 10^{-1}$ m
dkm	dekameter	$= 10$ m
hm	hectometer	$= 10^2$ m
km	kilometer	$= 10^3$ m
Mm	myriameter	$= 10^4$ m
	megameter	$= 10^6$ m

* $m\mu$ millimicron $= 10^{-9}$ m $\mu\mu$ micromicron $= 10^{-12}$ m

MASS g = gram		
μg^*	microgram	$= 10^{-6}$ g
mg	milligram	$= 10^{-3}$ g
cg	centigram	$= 10^{-2}$ g
dg	decigram	$= 10^{-1}$ g
dkg	dekagram	$= 10$ g
hg	hectogram	$= 10^2$ g
kg	kilogram	$= 10^3$ g
q	metric quintal	$= 10^2$ kg $= 10^5$ g
t	metric ton	$= 10^3$ kg $= 10^6$ g
c	metric carat	$= 200$ mg

* Symbol γ also used.

CAPACITY l = liter = 1.000 027 dm ³		
μl^*	microliter	$= 10^{-6}$ l
ml	milliliter	$= 10^{-3}$ l
cl	centiliter	$= 10^{-2}$ l
dl	deciliter	$= 10^{-1}$ l
dkl	dekaliter	$= 10$ l
hl	hectoliter	$= 10^2$ l

* Symbol λ also used.

AREA m ² = square meter		
mm ²	square millimeter	$= 10^{-6}$ m ²
cm ²	square centimeter	$= 10^{-4}$ m ²
dm ²	square decimeter	$= 10^{-2}$ m ²
a	are	$= 10^2$ m ²
ha	hectare	$= 10^4$ m ²
km ²	square kilometer	$= 10^6$ m ²

VOLUME m ³ = cubic meter		
mm ³	cubic millimeter	$= 10^{-9}$ m ³
cm ³	cubic centimeter	$= 10^{-6}$ m ³
dm ³	cubic decimeter	$= 10^{-3}$ m ³
km ³	cubic kilometer	$= 10^9$ m ³
ds	decistere	$= 0.1$ s $= 10^{-1}$ m ³
s	stere	$= 1$ m ³
dks	dekaistere	$= 10$ s $= 10$ m ³

B. MODERN SYSTEMS

Abyssinia.—var.: current, ca.:

Length	
1 pic	$= 0.686$ m
1 farsang	$= 5.07$ km
1 berri	$= \frac{1}{3}$ farsang

Mass	
1 rottolo	$= 311$ g
Unit	Rottolo
1 drachm	$= \frac{1}{128}$
1 derime	$= \frac{1}{128}$

1 wakea	$= \frac{1}{12}$
1 mocha	$= \frac{1}{16}$

Capacity, dry	
1 madega	$= 0.44$ l
1 ardeb	$= 10$ or 24 madega

Capacity, liquid	
1 kuba	$= 1.016$ l
Ägypten v. Egypt.	
Äthiopien v. Ethiopia.	
Algeria.—Since 1843 =	
France. Older:	

Length

1 pic (dzera à torky)	$= 0.640$ m
1 pic (dzera à rabry)	$= 0.480$ m
Unit	Pic
1 termin	$= \frac{1}{2}$
1 rebia	$= \frac{1}{2}$
1 nus	$= \frac{1}{2}$

Mass

1 ukkia	$= 34.13$ g
1 metical	$= ca. 4.7$ g
Unit	Ukkia
1 rottolo à thary	$= 16$
1 rottolo à khadhary	$= 18$
1 rottolo à kebyr	$= 24$
1 cantar	$= 100$ rottolo

Capacity, dry

1 caffiso	$= 317.47$ l
1 saah	$= 58$ l
1 tarri	$= \frac{1}{16}$ caffiso

Capacity, liquid

1 khoull	$= 16\frac{1}{2}$ l or 16 l
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Allemagne v. Germany.

Anam.—var.: ch., current:*

Length

1 thuoc moc	$= 0.425$ m
1 thuoc de ruong	$= 0.470$ m
1 thuoc vai	$= 0.644$ m

Unit	Thuoc
1 ly	$= 0.001$
1 phan	$= 0.01$
1 tat	$= 0.1$
1 tam	$= 5$
1 ngu	$= 10$
1 truong	$= 15$
1 sao	$= 30$
1 chai vai	$= 150$
1 that	$= 300$
1 mao	$= 150$
1 gon	$= 300$

Mass

1 dong	$= 3.775$ g
1 picul	$= 60$ kg

Unit	Dong
1 hao	$= 0.001$
1 li	$= 0.01$
1 fan	$= 0.1$
1 luong	$= 10$
1 neu	$= 100$
1 can	$= 160$
1 yen	$= 1600$
1 binh	$= 8000$
1 ta	$= 16\ 000$
1 quan	$= 18\ 000$

Area

1 ngu ²	$= 4.5156$ m ²
Unit	Ngu ²
1 thuoc	$= 6$
1 sao	$= 90$

* By an ordinance of 1872, units were defined in terms of metric.

Unit Ngu²

1 mau	$= 900$
1 quo	$= 1800$

Capacity

1 hao or shita	$= 28.26$ l
1 tao	$= 2$ hao

Angola.—m.c. 1910.

Arabia.—Provincial, current:

Length

1 covid	$= 0.482$ m
1 guz	$= 0.635$ m
1 cassaba	$= 3.84$ m
1 farsakh	$= 4.83$ km

Unit	Farsakh
1 baryd	$= 4$
1 marhala	$= 8$

Mass

1 maund	$= 1350$ g
1 ratl	$= ca. 460$ g

Unit	Maund
------	-------

1 coffilas	$= \frac{1}{16}$
1 vakias	$= \frac{1}{16}$
1 tukeas	$= \frac{1}{16}$
1 farzil	$= 10$
1 farecella	$= 150$
1 bahar	$= 150$
1 bokard	$= 150$

Capacity, dry

1 téman	$= 85$ l
---------	----------

Unit	Téman
1 mecmeda	$= \frac{1}{16}$
1 kella	$= \frac{1}{16}$
1 mec dema	$= \frac{1}{16}$

Capacity, liquid

1 nusfiah	$= 0.79$ l or 0.95 l
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Unit	Nusfiah
1 vakia	$= \frac{1}{16}$
1 cuddy	$= 4$
1 zudda	$= 8$

Argentine Republic.—m.c. 1887; m.o. 1863. Older,* provincial:

Length

1 vara	$= 0.8666$ m
Unit	Vara
1 linéa	$= \frac{1}{16}$
1 pulgada	$= \frac{1}{16}$
1 pié	$= \frac{1}{16}$
1 braza	$= 2$
1 cuadra	$= 150$
1 legua	$= 6000$

Mass

1 libra†	$= 459.4$ g
Unit	Libra
1 grano	$= \frac{1}{16}$
1 adarme	$= \frac{1}{16}$
1 onza	$= \frac{1}{16}$

* National system derived from old Spanish. Units given are those of province of Buenos Aires.

† 1 libra de farmacia $= \frac{1}{2}$ libra $= 344.5$ g.

Unit	Libra
1 arroba	= 25
1 quintal	= 100
1 tonelada	= 2000
Area	
1 vara ²	= 0.75 m ²
Capacity, dry	
1 fanega	= 137.1977 l
Unit	Fanega
1 cuartilla	= $\frac{1}{2}$
1 tonelada	= 7.5
1 lastre	= 15
Capacity, liquid	
1 frasco	= 2.375 l
Unit	Frasco
1 octava	= $\frac{1}{8}$
1 cuarta	= $\frac{1}{4}$
1 barrel	= 32
1 cuarter	= 48
1 pipa	= 192
Austria.—m.c. 1876; m.o. 1873. Older:	
Length	
1 Fuss*	= 0.316 08 m
1 Ell	= 0.7792 m
Unit	Fuss
1 Punkt	= $\frac{1}{1728}$
1 Linie	= $\frac{1}{144}$
1 Zoll	= $\frac{1}{12}$
1 Klafter	= 6
1 Meile	= 24 000
Mass, (1) ordinary	
1 Pfund	= 560.01 g
Unit	Pfund
1 Pfennig	= $\frac{1}{12}$
1 Denat	= $\frac{1}{12}$
1 Quentchen	= $\frac{1}{128}$
1 Loth	= $\frac{1}{8}$
1 Unze	= $\frac{1}{6}$
1 Vierding	= $\frac{1}{4}$
1 Mark	= $\frac{1}{2}$
1 Stein	= 20
1 Zentner	= 100
1 Saum	= 275
1 Karch	= 400
Mass, (2) for drugs	
1 Pfund apoth.	= $\frac{3}{4}$ Pfund
	= 420.01 g
Unit	Pfund apoth.
1 Gran	= $\frac{1}{5760}$
1 Scrupel	= $\frac{1}{48}$
1 Drachme	= $\frac{1}{6}$
1 Unze	= $\frac{1}{2}$
Area	
1 Joch	= 1600 Klafter ²
	= 57.557 a
1 Metze	= $\frac{1}{2}$ Joch
* Vienna.	

Capacity, dry	
1 Metze	= 61.489 l
Unit	Metze
1 Probmetze	= $\frac{1}{1024}$
1 Becher	= $\frac{1}{128}$
1 Futtermassel	= $\frac{1}{8}$
1 Muthmassel	= $\frac{1}{8}$
1 Achtel	= $\frac{1}{8}$
1 Viertel	= $\frac{1}{4}$
1 Muth	= 30
Capacity, liquid	
1 Mass	= 1.4151 l
Unit	Mass
1 Pfiff	= $\frac{1}{8}$
1 Seidel	= $\frac{1}{4}$
1 Halbe	= $\frac{1}{2}$
1 Viertel	= 10
1 Eimer	= 40
1 Fass	= 400
1 Dreiling	= 1200
1 Fuder	= 1280
Balearic Islands.—v. Spain.	
Local:	
Length	
1 canna	= 1.564 m
1 palmos	= $\frac{1}{2}$ canna
Mass	
1 rottolo	= 408 g
Unit	Rottolo
1 libra major	= 3
1 corta	= 9
1 quartano	= 9
1 arroba	= 26
1 misura	= 36
1 cantaro barbaresco	= 100
1 cantaro	= 104
1 cargo	= 312
Capacity, dry	
1 quartera	= 71.97 l
Unit	Quartera
1 barcella	= $\frac{1}{2}$
1 almude	= $\frac{1}{8}$
Capacity, liquid	
1 quartin	= 27.14 l
Unit	Quartin
1 quarte	= $\frac{1}{8}$
1 quarta	= $\frac{1}{8}$
Bavaria v. Germany.	
Belgian Congo.—m.c. 1911.	
Belgium.—m.c. 1820; at first with the names: aune = m, litron = l, livre = kg, once = hg, lood = dg, wigtje = g, Older:	
Length	
1 perche	= 6.497 m
1 pied	= $\frac{1}{3}$ perche

Mass	
1 livre	= 489.5 g
Unit	Livre
1 loth	= $\frac{1}{16}$
1 once	= $\frac{1}{8}$
1 marc	= $\frac{1}{2}$
1 stein	= 8
1 quintal	= 100
1 chariot	= 165
1 balle	= 200
1 schiffpfund	= 300
1 charge	= 400
Area	
1 arpent	= 400 perche ²
	= 130.6 a
Birmanie v. British India, Rangoon.	
Bolivia.—m.c. 1893; m.o. 1871. Older = Spain.	
Brazil.—m.c. 1862. Older:*	
Length	
1 pé	= 0.33 m
Unit	Pé
1 palmo	= $\frac{1}{2}$
1 vara	= $3\frac{1}{2}$
1 passo geometrico	= 5
1 braca	= $6\frac{1}{2}$
1 legoa	= 20 000
Mass	
1 libra	= 459.05 g
Unit	Libra
1 onza	= $\frac{1}{16}$
1 marco	= $\frac{1}{2}$
1 arroba†	= 32
1 quintal	= 128
1 tonelada	= 1728
Area	
1 tarefa	= 30 to 40 a
1 alqueire	= 242 or 484 a
Capacity	
1 almude	= 31.944 l
1 alqueire	= 40 to 320 l
Unit	Almude
1 canada	= $\frac{1}{2}$
1 pipa	= 15
1 tonel	= 30
Britain, British v. Great Britain.	
British India.—m.o. 1920.	
Current: British and local.	
Local,† provincial:	
BOMBAY.	
Length	
1 guz	= 0.6858 m
Unit	Guz
1 tassoo	= $\frac{1}{2}$
* Those of Portugal, with notable local differences.	
† 1 arroba metrica = 15 kg.	
‡ Local or national measures are now defined by their equivalents in British units.	

Unit	Guz
1 hath	} = $\frac{2}{3}$
1 covid	
1 cubit	
Mass	
1 seer	= 317.5147 g
Unit	Seer
1 tank	= $\frac{1}{7\frac{1}{2}}$
1 pice	} = $\frac{1}{8}$ or $\frac{1}{16}$
1 parah	
1 maund	= 40
1 candy	= 800
Area	
Unit	Are
1 ground	= 2.03
1 biggah	= 24.68
1 kani	= 30.75
1 cawnie	= 54
1 chahar	= 2962
Capacity	
1 parah	= 110.1 l
Unit	Parah
1 tipree	= $\frac{1}{1\frac{1}{8}}$
1 seer	= $\frac{1}{8\frac{1}{4}}$
1 adoulie	= $\frac{1}{1\frac{1}{6}}$
1 candy	= 8
1 garce	= 80
CALCUTTA.	
Length	
1 guz*	= 0.9144 m
Unit	Guz
1 jaob	} = $\frac{1}{1\frac{1}{4}}$
1 jow	
1 unglee	= $\frac{1}{1\frac{1}{8}}$
1 moot	= $\frac{1}{1\frac{1}{4}}$
1 span	= $\frac{1}{2}$
1 covid	} = $\frac{1}{2}$
1 haut	
1 danda	= 2
1 niranga	= 10
1 ooss	= 2000
Mass	
1 seer	= 933.04 g
Unit	Seer
1 ruttee	= $\frac{1}{7\frac{1}{8}\frac{1}{8}\frac{1}{8}}$
1 masha	= $\frac{1}{9\frac{1}{8}\frac{1}{8}}$
1 tolah	} = $\frac{1}{8\frac{1}{6}}$
1 sicca	
1 chittack	= $\frac{1}{1\frac{1}{8}}$
1 pouah	= $\frac{1}{2}$
1 raik	= $\frac{1}{4}$
1 pally	} = 5
1 dhurra	
1 maund (bazar)	= 40
Area	
1 guz ²	= 0.836126 m ²
Unit	Guz ²
1 chattack	= 5
1 cottah	= 80
1 biggah	= 1600
1 tenab	= 2500
* Old guz = 0.915 m.	

British India.—Cont'd.

Capacity	
1 pally	= 5.0 to 5.5 l
Unit Pally	
1 chattack	= $\frac{1}{80}$
1 khoonke	= $\frac{1}{80}$
1 kunk	= $\frac{1}{80}$
1 raik	= $\frac{1}{4}$
1 soally	= 20
1 khahoon	= 320

CEYLON.

Length	
1 covid	= 0.464 m
Mass	
1 candy	} = 226.8 kg
1 bahar	

Capacity	
1 ammonam	= 203.4 l
Unit Ammonam	
1 parrah	= $\frac{1}{8}$
1 seer	= $\frac{1}{88}$

MADRAS.

Length	
1 covid	= 0.472 m
Mass	
1 seer	= 283.495 g
1 cafh	= 1.230 447 mg
Unit Cafh	
1 fanam	= 80
1 pagoda	= 2880
Unit Seer	
1 pagoda	= $\frac{1}{80}$
1 pollam	} = $\frac{1}{8}$
1 varahan	
1 powe	= $\frac{1}{4}$
1 vis	= 5
1 maund	= 40
1 candy	= 800

Area	
1 cawnie	= 53.41 a
1 maoney	= $\frac{1}{4}$ cawnie

Capacity	
1 puddy	= 1.533 l
Unit Puddy	
1 olluck	= $\frac{1}{8}$
1 measure	= 1
1 marcal	= 8
1 parah	= 40
1 garce	= 3200

RANGOON.

Length	
1 sandong	= 0.5588 m
Unit Sandong	
1 palgat	= $\frac{1}{2}$
1 taim	} = $\frac{1}{2}$
1 cubit	
1 lan	= 4
1 bamboo	} = 7
1 dha	
1 oke thapal	= 140
1 dain	= 7000

Mass

1 tical	= 16.32 g
Unit Tical	
1 ruay	= $\frac{1}{4}$
1 pai	= $\frac{1}{8}$
1 moo	= $\frac{1}{8}$
1 mat	= $\frac{1}{4}$
1 cattie	= 33 $\frac{1}{2}$
1 viss	= 100
1 candy	= 15 000

Capacity

1 byee	= 0.505 l
Unit Byee	
1 lamany	= $\frac{1}{8}$
1 zalay	= $\frac{1}{4}$
1 zayoot	= 2
1 seit	= 4
1 kwai	= 8

STRAITS SETTLEMENTS.

Mass	
1 kati	= 604.79 g
Unit Kati	
1 tahlil	= $\frac{1}{8}$
1 pikul	= 100
1 bhara	= 300
1 koyan	= 4000

Capacity

1 gantang*	= 4.545 96 l
Unit Gantang	
1 para	= 10
1 koyan	= 800

Bulgaria.—m.c. 1892.

Burma v. British India.

Cambodia v. Indo-China.

Canada.—m.o. 1871. Current = British, † French names are:

Length

1 pouce	= 1 inch
1 chainon	= 1 link
1 pied	= 1 foot
1 verge	= 1 yard
1 perche	= 1 rod, pole
1 chaine	= 1 chain ‡

Mass

1 livre	= 1 pound av.
1 cent	} = 1 hundred weight
1 quintal	
1 tonneau	= 1 short ton

Area

1 arpent	= 34.196 a
----------	------------

Capacity

1 pinte	= 1 quart
1 chopine	= 1 pint
1 boisseau	= 8 gallons
1 minot	= 39.025 l

* Gantang = British gallon.

† Old French measures have been used, but only minot and arpent are now in use.

‡ Gunther's.

Ceylon v. British India.

Chile.—m.c. 1848. Older were from Spanish; legal values:

Length	
1 bara	= 0.836 m
Unit Bara	
1 linea	= $\frac{1}{48}$
1 pulgada	= $\frac{1}{8}$
1 pié	= $\frac{1}{3}$
1 cuadra	= 150
1 legua	= 5400

Mass	
1 libra	= 460.093 g
Unit Libra	

1 granos	= $\frac{1}{8217}$
1 adarme	= $\frac{1}{288}$
1 castellano	= $\frac{1}{108}$
1 onza	= $\frac{1}{16}$
1 arroba	= 25
1 quintale	= 100

Area	
1 bara ²	= 0.698 896 m ²

Capacity, dry

1 almude	= 8.083 l
1 fanega	= 12 almude

Capacity, liquid

1 cuartillo	= 1.111 l
1 arroba	= 32 cuartillo

China.—m.o. 1903 with the following names:

Length	
kilometer	= sin li
hectometer	= sin yin
dekameter	= sin tchang
meter	= sin tchi
decimeter	= sin tshwen
centimeter	= sin fen
millimeter	= sin li

Area	
hectare	= sin khing
are	= sin meou
centare	= sin li

Capacity	
kiloliter	= sin ping
hectoliter	= sin chi
dekaliter	= sin teou
liter	= sin cheng
deciliter	= sin ho
centiliter	= sin cho
milliliter	= sin tshwo

Great diversity in national system; since 1908, defined by metric equivalents. (The orthography here employed is arbitrary; there is diversity in provincial pronunciation.)

Length	
1 tchi	= 0.32 m
Unit Tchi	
1 hoé	= 10 ⁻⁶
1 su	= 10 ⁻⁸

Unit Tchi	
1 hao	= 10 ⁻⁴
1 lt	= 10 ⁻³
1 fen	= 10 ⁻²
1 tsouen	= 10 ⁻¹
1 pou	= 5
1 tchang	= 10
1 yin	} = 100
1 yan	
1 fen	= 120
1 kyo	= 300
1 li	= 1800
1 poú	= 18 000
1 thsan	= 144 000
1 tou	= 450 000

Mass	
1 liang	= 37.301 g
Unit Liang	
1 hao	= 0.0001
1 lii	= 0.001
1 fen	= 0.01
1 tsien	= 0.1
1 kin	} = 16
1 tchin	
1 kwan	= 480
1 tan	= 1600
1 shih	= 1920

Area	
1 meou	= 6000 tchi ²
	= 614.4 m ²

Unit Meou	
1 hao	= $\frac{1}{10000}$
1 pou ²	} = $\frac{1}{4}$
1 kung	
1 lyi	= $\frac{1}{100}$
1 fen	= $\frac{1}{10}$
1 kish	= $\frac{1}{4}$
1 king	= 10
1 ching	= 100

Volume	
1 tchi ³	= 32.768 dm ³
1 ma	} = 100 tchi ³
1 fang	

Capacity	
1 cheng	= 1.035 44 l
Unit Cheng	
1 quei	= 0.0001
1 ço	= 0.001
1 chao	= 0.01
1 yo	= 0.5
1 khô	= 0.1
1 to	= 10
1 hou	= 50
1 chei	} = 100
1 sei	
1 ping	= 500

Capacity, liquid

Liquids are measured by weight.

Chypre, Cipro v. Cyprus.

Cochin-China v. Indo-China.

Columbia.—m.c. 1854, but following, derived from metric system, are current:

Length	
1 vara	= 0.8 m
Unit	Vara
1 pulgada	= $\frac{1}{32}$
1 cuarta	= $\frac{1}{4}$
1 cuadra	= 100
1 legua	= 6250
Mass	
1 libra	= 500 g
Unit	Libra
1 onza	= $\frac{1}{16}$
1 arroba	= 25
1 quintal	= 100
1 saco	= 125
1 carga	= 250
1 tonelada	= 2000
Area	
1 vara ²	= 0.64 m ²
1 fanegada	= 10 000 vara ²
Círenalque v. Tripoli.	
Congo, Belgian.—m.c. 1911.	
Costa Rica, Guatemala, Honduras, Nicaragua, Salvador.—m.c. 1912 by a joint convention; in partial use at earlier dates. Older (modified Spanish, English, and local):	
Length	
1 vara	= 0.8393 m (Costa Rica)
	= 0.8359 m (Guatemala)
	= 0.8128 m (Honduras)
Unit	Vara
1 cuarta	= $\frac{1}{4}$
1 tercia	= $\frac{1}{3}$
1 mecate	= 24
Mass	
1 caja	= 16 kg
1 fanega	= 92 kg
1 carga	= 161 kg
Area	
1 manzana	= 10 000 vara ²
	= 6960.5 m ² (Costa Rica)
	= 6987.4 m ² (Guatemala)
	= 6987.4 m ² (Nicaragua)
1 caballeria	= 64 manzana
Capacity	
1 botella	= 0.63 to 0.67 l
1 cajuela	= 16.6 l
Cuartillo is very variable.	
Cuba.—m.c. 1858, but others (old Spanish, American, and local) are current:	
Mass	
1 tonelada	= 1015.65 kg
1 tercio	= 72.22 kg
Area	
1 caballeria	
Cubana	= 1342.02 a
1 cordele	= $\frac{1}{32}$ caballeria

Capacity	
1 bocoy	= 136.27 l
1 barrile	= $\frac{1}{2}$ bocoy
C y p r u s.—British system.	
Accepted equivalents:	
Length	
1 pic	= 2 foot
	= 0.6096 m
Mass	
1 oke	= 2.8 pound av
	= 1270.06 g
1 moosa*	= 50 700 g
Unit	Oke
1 drachme	= $\frac{1}{160}$
1 rottolo	= 0.44
1 stone	= 5
1 kantar	= 44
1 kantar (Aleppo)	= 180
1 ton	= 800
Area	
1 donum	= 1600 yard ²
	= 13.378 a
1 scala	= 1 donum
Capacity	
1 oke	= 1.278 55 l
1 cass	= 4.73 l
1 kile†	= 36.368 l
1 medimno	= 75.05 l
1 kartos	= 4 oke
1 kouza	= 8 oke
1 gomari	= 128 oke
Cyrenalca v. Tripoli.	
Czechoslovakia.—m.c. 1876.†	
Local:	
Length	
1 latro	= 1.917 m
BOHEMIA.	
1 stopa§	= 0.296 m
1 sah	= 1.778 m
1 mile	= 7.003 km
PRAGUE.	
1 loket	= 0.593 m
MORAVIA.	
1 stopa§	= 0.284 m
1 loket	= 0.594 m
SILESIA.	
1 loket	= 0.579 m
1 mile	= 6.483 km
Area	
BOHEMIA.	
1 merice	= 19.99 a
1 korec	
1 strych	= 28.78 a
1 mira	
Unit	Korec
1 jitro	= 2
1 lan	= 60
* Moosa = hundredweight.	
† Kile = bushel.	
‡ Old Vienna (v. Austria) and some local measures were still in use when the state was established.	
§ Stopa = strevic.	

Capacity	
1 merice*	= 70.6 l
1 korec	
1 strych	= 93.592 l
Denmark.—m.c. 1912; m.o. 1910. Older:	
Length	
1 fod	= 0.313 857 m
Unit	Fod
1 linie	= $\frac{1}{144}$
1 tomme	= $\frac{1}{12}$
1 aln	= 2
1 faon, favn	= 6
1 ruthe	= 10
1 miil	= 24 000
Mass	
1 pund	= 500 g
Unit	Pund
1 es	= $\frac{1}{16}$
1 ort	= $\frac{1}{16}$
1 quintin	= $\frac{1}{16}$
1 loth	= $\frac{1}{16}$
1 unze	= $\frac{1}{16}$
1 mark	= $\frac{1}{16}$
1 bismerpund	= 12
1 lispund	= 16
1 wog	= 36
1 waag	= 36
1 quintal	= 100
1 centner	= 100
1 skippund	= 320
1 skyplast	= 5200
1 quint	= 0.1
1 ort	= 0.01
1 kvint	= 0.001
Area	
1 tondelande	= 55.162 a
1 tonde	= 283.69 a
Unit	Tonde
1 penge	= $\frac{1}{16}$
1 album	= $\frac{1}{16}$
1 fjerdingar	= $\frac{1}{16}$
1 skiepper	= $\frac{1}{16}$
1 pflug	= 32
Capacity, dry	
1 korntonde	= 139.12 l
Unit	Korntonde
1 pott	= $\frac{1}{144}$
1 achtel	= $\frac{1}{144}$
1 viertel	= $\frac{1}{144}$
1 skieppe	= $\frac{1}{16}$
1 ottingkar	= $\frac{1}{16}$
1 fjerdingkar	= $\frac{1}{16}$
1 last	= 22
Capacity, liquid	
1 pott	= 0.9661 l
Unit	Pott
1 paegel	= $\frac{1}{144}$
1 kande	= 2
1 stubchen	= 4
* Moravian.	

Unit	Pott
1 viertel	= 8
1 fod ²	= 32
1 anker*	= 40
1 ohm*	= 160
1 oxhoft*	= 240
1 pipe*	= 480
1 fuder*	= 960
Deutschland v. Germany.	
Dutch East Indies.—Same as Netherlands. Old Dutch and local measures are also used. Latter very variable; recently they have been legally defined by their metric equivalents. Current:	
Length	
1 depa	= 1.70 m
Unit	Depa
1 hasta	= $\frac{1}{4}$
1 kilan	= $\frac{1}{4}$
Mass. (1) Ordinary	
1 pikol	= 61.761 3025 kg
1 pecul	
Unit	Pikol
1 thail	= $\frac{1}{16}$
1 catti	= $\frac{1}{16}$
1 kabi	= $\frac{1}{16}$
1 kulack	= 0.0725
1 amat	= 2
1 small bahar	= 3
1 large bahar	= 4.5
1 timbang	= 5
1 kojang	
(Batavia)	= 1667.555 kg
1 kojang	
(Semarang)	= 1729.316 kg
1 kojang	
(Soerabaya)	= 1852.839 kg
Mass. (2) For precious metals	
1 thail	= 54.090 g
Unit	Thail
1 wang	= $\frac{1}{16}$
1 tali	= $\frac{1}{16}$
1 soekoe	= $\frac{1}{16}$
1 reaal	= $\frac{1}{16}$
Mass. (3) For opium	
1 thail	= 38.601 g
Unit	Thail
1 tji	= 0.1
1 tjembang Mata	= 0.001
1 hoen	
Area	
1 bahoe	= 70.965 a
1 bouw	
1 lieue ² †	= 55.0632 km
Volume	
1 kojang	= 1.976 362 m ³
1 toembak	= 6.684 m ³
Capacity, dry	
1 kojang	= 2011.2679 l
1 pikol	= $\frac{1}{16}$ kojang
* Variable.	
† Geographic.	

Dutch East Indies.—*Cont'd.*

Capacity, liquid

(Legal equivalents)

Unit	Liter
1 takar*	= 25.770
1 kit*	= 15.159
1 koelak*	= 3.709
1 kan†	= 1.5751
1 mutsjet†	= 0.1516
1 pintje*	= 0.0758

Ecuador.—m.c. 1865, but the British and, more generally the old Spanish, measures are currently used.

Egypt.—m.o. 1873; m.c. in government use, 1891. Current:†

Length

1 diraa baladi	= 0.58 m
1 kasabah	= 3.55 m

Unit	Diraa
1 kirat	= $\frac{1}{24}$
1 abdat	= $\frac{1}{6}$
1 kadam	= $\frac{1}{2}$
1 pic	= 1
1 gasab	= 4
1 mil hachmi	= 1000
1 farsakh	= 3000

Mass

1 oke	= 1248 g
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Unit	Oke
1 kirat	= $\frac{1}{8400}$
1 dirhem	= $\frac{1}{160}$
1 miskal	= $\frac{1}{800}$
1 okieh	= 0.03
1 rotoli	= 0.36
1 kantar	= 36
1 helm	= 200

Area

1 feddan	= 42.008 a
----------	------------

Unit	Feddan
1 sahme	= $\frac{1}{160}$
1 kirat kamel	= $\frac{1}{24}$
1 feddan masri	= 1

Capacity

1 keddah	= 2.0625 l
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Unit	Keddah
1 kirat	= $\frac{1}{84}$
1 khanoubah	= $\frac{1}{16}$
1 toumna	= $\frac{1}{8}$
1 robhah	= $\frac{1}{4}$
1 nisf keddah	= $\frac{1}{2}$
1 malouah	= 2
1 rob	} = 4
1 roubouh	
1 keila	= 8
1 ardeb	= 96
1 daribah	= 768

* For oil.

† For various products.

† In national system, units and their interrelations were very variable, but since 1891, have been defined by their metric equivalents.

England v. Great Britain.

Ecuator v. Ecuador.

Eritrea.—m.o. Local, provincial:

Length

1 cubi	= 0.32 m
1 emmet	} = 0.46 m
1 derah	

Mass

1 rotolo	= 448 g
1 okia	= $\frac{1}{8}$ rotolo
1 gisla	= 163 kg

Capacity

1 messé	= 1.50 l
---------	----------

Unit Messé

1 cabaho	= 4
1 tanica	= 12
1 ghebeta	= 16
1 entelam	= 128

Espagne v. Spain.

Esthonia.—Russian and local.

Current:

Length

1 archine (Russian)	= 0.7112 m
1 elle (Livonian)	= 0.6096 m

Unit Archine

1 elle (Kuunar)	= 0.75
1 faden	= 3

Mass

1 pfund	= 430 g
Unit	Pfund
1 quent	= $\frac{1}{128}$
1 loth	= $\frac{1}{84}$
1 liespfund	= 20
1 centner	= 120
1 tonne	= 240
1 schiffspfund	= 400

Area

Reval	
1 lofstelle	= 18.55 a
1 tonnland	= 54.627 a

Livonian

1 lofstelle	= 37.1 a
1 tonnland	= 51.94 a

Capacity

1 hulmit	= 11.48 l
Unit	Hulmit
1 lof (Reval)	= 3
1 lof (Livonian)	= 6
1 tonne (Livonian)	= 12

Etablissements des Détroits v. British India.

Etats-Unis v. United States.

Ethiopia.—var. Current:

Length

(Approximate only)

Unit	cm
1 tat	= 2.5
1 gat	= 8
1 sinzer	= 16
1 kend	= 49

Mass

1 kasm	= 3.90 g
1 neter	= 336 g
1 farasula*	= 13.478 kg
1 farasula†	= 16.85 kg
1 farasula‡	= 17.972 kg
Unit	Kasm
1 mutagalla	= 2
1 alada	= 4
1 wogiet	= 8

Capacity

1 menelik	= 1 l (approximate)
Filippine v. Philippine.	
Finland.—m.c. 1892; m.o. 1887. Older (Russian and local):	

Area

1 tunnland	= 46.54 a
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Capacity

1 tunna	= 163.49 l
1 kannor	= $\frac{1}{8}$ tunna
1 ottingar	= 15.71 l
1 sextingkar	= $\frac{1}{2}$ ottingar

France.—m.c. 1794. Other legal units:

Length

1 mille marin	= 1852 m
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Volume

1 tonneau de jauge	= 2.83 m ³
1 tonneau de mer	= 1.44 m ³
Old measures derived from the system of Charlemagne are:	

Length

1 toise§	= 1.949 0365 m||
1 toise§	= 1.949 090 m¶

Unit Toise

1 ligne	= $\frac{1}{64}$
1 pouce	= $\frac{1}{2}$
1 pied	= 1
1 aune	= 0.6064
1 lieue	= 2280.3
1 mille marin	= 950.13
1 lieue marine	= 2850.4

Mass

1 livre**	= 489.505 85 g
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Unit Livre

1 grain	= $\frac{1}{7000}$
1 scruple	= $\frac{1}{24}$
1 gros	} = $\frac{1}{4}$
1 drachme	
1 once	= $\frac{1}{8}$
1 marc ††	= $\frac{1}{2}$

* For ivory.

† For coffee.

‡ For rubber.

§ Toise de Perou at 16.25°C.

|| Equivalent made legal in 1799.

¶ By measurement, in 1887, by J. R. Benoit.

** One livre de Charlemagne = 367.128 g.

†† 1 Marc de la Rochelle = 244.75 g

1 Marc de Limoges = 240.93 g

1 Marc de Tours = 237.87 g

1 Marc de Troyes et Paris = 260.05 g

Unit Livre

1 quintal	= 100
1 millier	= 1000

Unit Livre (Ch)

1 sol	= $\frac{1}{20}$
1 denier	= $\frac{1}{240}$
1 obole	= $\frac{1}{480}$
1 grain	= $\frac{1}{7200}$

Area

1 pied²	= 0.10552 m²
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Unit Pied²

1 toise²	= 36
1 perche de Paris	= 324
1 perche des Eaux et Forêts	= 484
1 arpent de Paris	= 32 400
1 arpent des Eaux et Forêts	= 48 400

Capacity, dry

1 boisseau	= 1.862 78 l*
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Unit Boisseau

1 litron	= $\frac{1}{8}$
1 quart	= $\frac{1}{4}$
1 minot	= 3
1 mine	= 6
1 setier	= 12
1 muid	= 144

Capacity, liquid

1 muid	= 274.239 l†
1 muid	= 268.241 l†
1 pinte	= 0.931 389 l§

Unit Pinte

1 roquille	= $\frac{1}{84}$
1 posson	= $\frac{1}{8}$
1 demi-setier	= $\frac{1}{2}$
1 chopine	= $\frac{1}{2}$
1 pot	= 2
1 velte	= 8
1 quartreau	= 72
1 feuillette	= 144
1 muid	= 288

Francia, Isola di v. Mauritius.

Frankreich v. France.

Germany.—m.c. 1872. Since the beginning of the nineteenth century, the other units and their interrelations have been fairly definite, but before that there was great diversity.

Length: fundamental unit was Fuss (foot), its value, depending upon the state, varied from 0.280 to 0.320 m. The one most extensively used was the Rheinlandischer Fuss (Rhenish foot) = 0.313 857 m. Mass: fundamental unit was Pfund

* From 1 muid = 268.241 l by relation 144 boisseau = 1 muid (see Capacity, Liquid).

† Legal value.

‡ Derived from concrete standards.

§ From 1 muid = 268.241 l by relation 288 pinte = 1 muid.

(pound), its value generally varied little from 467 g; during transition period preceding 1872 the accepted equivalents were Pfund = 30 Loth = 300 Zeut = 3000 Korn; Centner = 100 Pfund. Older:

BAVARIA.

Length

1 Fuss	= 0.291 86 m
1 Elle	= 0.833 01 m

Unit

1 Linie	= $\frac{1}{14}$
1 Zoll	= $\frac{1}{2}$
1 Ruthe	= 10
1 Chauseemeile	= 25 406

Mass

1 Pfund	= 560 g
Unit	Pfund
1 Gran	= $\frac{1}{7680}$
1 Pfennig	= $\frac{1}{32}$
1 Quint	= $\frac{1}{128}$
1 Loth	= $\frac{1}{32}$
1 Unze	= $\frac{1}{8}$
1 Zentner	= 100

Area

1 Morgen	} = 34.072 a
1 Tagwerk	
1 Juchert	= 400 Ruthe ²

Capacity, dry

1 Metzen	= 37.0596 l
Unit	Metzen
1 Dreissiger	= $\frac{1}{32}$
1 Mässel	= $\frac{1}{8}$
1 Scheffel	= 6

Capacity, liquid

1 Masskanne	= 1.069 03 l
Unit	Masskanne
1 Zoll ³	= $\frac{1}{16}$
1 Eimer	= 60 or 64
1 Fass	= 1600

PRUSSIA.

Length

1 Fuss	= 0.313 857 m
Unit	Fuss

1 Linie	= $\frac{1}{14}$
1 Zoll	= $\frac{1}{2}$
1 Ruthe	= 12
1 Meile	= 24 000
1 Elle	= 25.5 Zoll

Mass

1 Pfund	= 467.711 g
Unit	Pfund
1 Quentchen	= $\frac{1}{80}$
1 Loth	= $\frac{1}{2}$
1 Stein	= 22
1 Centner	= 110
1 Schiffspfund	= 330

Area

1 Morgen	= 25.532 24 a
1 Morgen	= 180 Ruthe ²

Capacity, dry

1 Metze	= 3.435 89 l
Unit	Metze
1 Quart	= $\frac{1}{2}$
1 Zoll ³	= $\frac{1}{16}$
1 Scheffel	= 16

Capacity, liquid

1 Quart	= 64 Zoll ³
1 Quart	= 1.145 03 l

Unit

1 Anker	= 30
1 Eimer	= 60
1 Ohm	= 120
1 Oxhoft	= 180
1 Fuder	= 720

WÜRTTEMBERG.

Length

1 Fuss	= 0.286 49 m
Unit	Fuss

1 Linie	= 0.01
1 Zoll	= 0.1
1 Elle	= 2.144
1 Ruthe	= 10
1 Meile	= 26 000

Mass

1 Pfund	= 467.728 g
1 Apotheker-Pfund	= 357.647 g
Unit	Pfund
1 Quentlein	= $\frac{1}{80}$
1 Loth	= $\frac{1}{2}$
1 Mark	= $\frac{1}{2}$
1 Zentner	= 104

Area

1 Ruthe ²	= 8.207 66 m ²
1 Morgen	= 384 Ruthe ²
1 Juchart	} = 576 Ruthe ²
1 Tagwerk	

Capacity, dry

1 Simri	= 942.125 Zoll ³
	= 22.1533 l
Unit	Simri
1 Viertelein	= $\frac{1}{16}$
1 Erklein	= $\frac{1}{8}$
1 Vierling	= $\frac{1}{4}$
1 Scheffel	= 8

Capacity, liquid

1 Maass	= 78.125 Zoll ³
	= 1.837 05 l
Unit	Maass
1 Schoppe	= $\frac{1}{2}$
1 Imi	= 10
1 Eimer	= 160
1 Fuder	= 960

Gioppone v. Japan.

Great Britain, Irish Free State, and Northern Ireland.—m.o. 1864. Since 1898, the national measures are convertible to metric by the legally sanctioned factors given below. National fundamental units defined thus: *Length*: The yard is distance at 62°F between axes of two lines traced on gold plugs

set in a bronze bar preserved at the Standards Department of the Board of Trade. *Mass*: The pound avoirdupois is the mass of a certain platinum standard, similarly preserved.

Capacity: The gallon is the volume of 10 pounds avoirdupois of pure water, as weighed in air against brass weights, the water and air being at the temperature of 62°F and the barometer at 30 inches. In official comparisons, the density of brass is taken as 8.143 g/cm³. Some of the units in the following tables are not in current use.

Length

1 yard* (yd.)	= 0.914 3992 m
1 foot (ft.)	= $\frac{1}{3}$ yd.
	= 30.479 97 cm
1 inch (in.)	= $\frac{1}{36}$ yd.
	= 2.539 998 cm

Unit

1 mil	= 0.001
1 point	= $\frac{1}{72}$
1 line	= $\frac{1}{64}$
1 barleycorn	= $\frac{1}{3}$
1 nail	= 2.25
1 palm	= 3
1 hand	= 4
1 span	} = 9
1 quarter	
1 foot	= 12
1 cubit	= 18
1 pace	= 30
1 yard	= 36
1 ell	= 45

Unit

1 fathom	= 6
1 pole	} = 16.5
1 rod (rd.)	
1 perch	
1 rope	= 20
1 chain†	= 66
1 skein	= 360
1 furlong	= 660
1 cable length	= 720
1 mile (statute)	= 5280
1 mile (nautical)	} = 6080
1 knot	
1 league	= 15 840

Mass

1 pound avoirdupois (lb. av.)	= 453.592 45 g
	= 7 000 grain
1 grain (gr.)	= 64.798 182 mg
(Three systems: avoirdupois, troy, apothecary.)	

* This is the present legal equivalent of the imperial yard; recent comparisons by the National Physical Laboratory show that the yard as defined by the Weights and Measures Act of 1878 = 0.914 3987 m.

† Gunther's chain, divided into 100 link.

Avoirdupois (av.)

(General use)

Unit	Pound
1 dram (dm.)	= $\frac{1}{16}$
1 ounce (oz.)	= $\frac{1}{8}$
1 clove or customary stone	= 8
1 stone (legal)	= 14
1 quarter	= 28
1 cental	= 100
1 hundred-weight (cwt.)	= 112
1 wey	} = 252*
1 load	
1 ton	= 2240

Troy (t.)

(For precious metals)

Unit	Grain
1 pennyweight (dwt.)	= 24
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Apothecary (ap.)

(For dispensing drugs)

Unit	Grain
1 scruple (s.)	= 20
1 drachm (dr.)	= 60
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Area

1 inch ² (sq. in.)	= 6.451 5898 cm ²
1 foot ² (sq. ft.)	= 929.0289 cm ²
1 yard ² (sq. yd.)	= 0.836 1259 m ²
1 acre (A.)	= 4046.849 m ²
Unit	Foot ²
1 inch ²	= $\frac{1}{144}$
1 yard ²	= 9

Unit

1 pole ² (sq. po.)	} = 30.25
1 rod ²	
1 perch ²	
1 chain ² † (ch.)	
	= 484
1 rood	= 1210
1 acre (A.)	= 4840
Unit	Acre
1 mile ² (sq. mi.)	= 640

Volume

1 yard ³ (cu. yd.)	= 0.764 552 85 m ³
1 foot ³ (cu. ft.)	= 28 316.77 cm ³
1 inch ³ (cu. in.)	= 16.387 0253 cm ³

Unit

1 inch ³	= $\frac{1}{1728}$
1 yard ³	= 27

* Variable.

† Gunther's chain.

Great Britain.—Cont'd.

Unit	Foot ³
1 register	
ton	= 100
1 rod	= 1000
<i>Capacity, dry</i>	
1 gallon (gal.)	= 4.545 9631 l
1 bushel (bu.)	= 8 gallon
	= 35.367 7048 l
Unit	Gallon
1 quartern	= $\frac{1}{2}$
1 peck	= 2
1 bucket	= 4
1 bushel	= 8
1 firkin	= 9
1 kilderkin	= 18
1 barrel	= 36
1 hogshead	= 63
1 puncheon	= 84
1 butt	= 126
Unit	Bushel
1 strike	= 2
1 sack	} = 3
1 bag	
1 coomb	= 4
1 quarter	= 8
1 seam	= 8
1 chaldron	= 32*
1 wey	} = 40*
1 load	
1 last	= 80*

Capacity, Liquid

1 gallon (gal.)	= 4.545 9631 l
Unit	Gallon
1 gill	} = $\frac{1}{16}$
1 quartern	
1 noggin	} = $\frac{1}{8}$
1 pint	
1 quart	= $\frac{1}{4}$
1 pottle	= $\frac{1}{2}$

Greece.—m.c. 1922; m.o. 1836. Older:

Length

1 piki varies	0.640 to 0.670 m
1 pic	= 1 piki
1 small piki of Constantinople	= 0.648 m
1 large piki of Constantinople	= 0.669 m
1 piki (masonry)	= 0.750 m

Mass

1 dramme	= 3.2 g
1 livre (Venetian)	= 450 g
1 mna	= 1.5 kg
1 mine (royal)	= 1.5 kg
1 oka†	= 1.280 kg
1 oka	= 1.250 to 1.333 kg
1 stater	= 56.32 kg
1 talanton	= 150 kg

Area

1 stemma	= 10 a
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* Variable.

† 0.85331 royal mine.

Capacity

1 oka	= 1.333 to 1.340 l
1 baril	= 74.236 l
Grossbritannien v. Great Britain.	
Guam.—Metric is compulsory.	
Guatemala v. Costa Rica.	
Guinea.—m.c. 1910. Older = Portugal, England, and local:	

Length

1 pik	= 0.578 m
1 jacktan	= 3.658 m

Mass

1 benda	= 64.2 g
1 kantar	= 977 kg
1 gammell	= $\frac{1}{2}$ kantar

Unit	Benda
1 akey	= $\frac{1}{16}$
1 mediatable	= $\frac{1}{8}$
1 aguirage	= $\frac{1}{16}$
1 quinto	= $\frac{3}{16}$
1 piso	} = $\frac{1}{8}$
1 uzan	
1 seron	= $\frac{3}{16}$
1 benda (offa)	= $\frac{1}{2}$

Haiti.—m.c. 1921. Older = British, old French, and Spanish; legal equivalents during transition period:

Length

1 toise	= 1.9488 m
1 aune	= 1.188 m

Area

1 carreau	= 1292.3 m
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Volume

1 baril	= 0.1 m ³
1 corde	= 3.84 m ³
1 toise	= 8 m ³

Holland v. Netherlands.

Honduras v. Costa Rica.

Hungary.—m.c. 1876. Older = old Vienna:

Length

1 mertföld	} = 8.3536 km
1 meile	
1 marok	} = 0.105 36 m
1 faust	

Area

1 hold	= 43.16 a
1 joch	= 43.16 a
1 meile ²	= 6978 ha

Volume

1 eimer	= 54.30 l
1 halbe	} = $\frac{1}{4}$ eimer
1 itcze	
1 metzen	} = 62.53 l
1 ako	

Iceland.—m.c. 1907. Older (analogous to Danish) were defined by their metric equivalents.

Length

1 fet	= 0.313 85 m
1 sjomila	= 1855 m

Unit	Fet
1 lina	= $\frac{1}{144}$
1 pumlungur	= $\frac{1}{12}$
1 alin	= 2
1 faðmur	= 6
1 mila a landi	= 24 000

Mass

1 pund	= 0.5 kg
Unit	Pund
1 mark	= 2
1 fisk	= 8
1 fierding	= 40
1 liespund	= 64
1 tunna smjör	= 224
1 skippund	} = 320
1 batt	

Area

1 ferfaðmur	= 3.546 m ²
1 fermila	= 56.7383 km ²

Unit	Ferfaðmur
1 ferpumlungur	= $\frac{1}{184}$
1 ferfet	= $\frac{1}{8}$
1 feralin	= $\frac{1}{2}$
1 tundagslatta	= 900
1 engjateigur	= 1600

Capacity

1 pottar	= $\frac{1}{16}$ fet ³
	= 0.9661 l

Unit	Pottar
1 kornskeppa	= 18
1 anker	= 39
1 almenn turma	= 120
1 öltunna	= 136
1 korntunna	= 144

India v. British India; v. Indo-China.

Indies, East v. British India; v. Dutch East Indies.

Indo-China, British v. British India.

Indo-China, French:
COCHIN CHINA.—m.c. 1911, with the names:

Length

1 môt thuoc	= 1 m
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Mass

1 môt cân tây	= 1 kg
1 môt đồng cân tây	= 1 g
1 picul	= 60 kg

Capacity

1 vuông môt bat tây	= 1 l
1 vuông môt gia	= 40 l
CAMBODIA.—m.c. 1914, with the names:	

Length

1 muoi mètre	= 1 m
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Mass

1 pram rôi	= 1 kg
1 muoi gramme	= 1 g
1 hocsep	= 60 kg

Capacity

1 muoi litre	= 1 l
1 sêsep litre	= 40 l

Irish Free State v. Great Britain.

Islande v. Iceland.

Italian colonies.—Metric compulsory.

Italy.—m.c. 1861; adopted in Milan as early as 1803, with the following names:

Length

metro	= m
palmo	= dm
dito	= cm
atomo	= mm

Mass

libbra nuova	= kg
oncia	= hg
grosso	= dkg
denar	= g
grano	= dg

Capacity

soma	= hl
mina	= dkl
pinta	= l
coppo	= dl

Older, provincial:

Length

1 piede liprando	= 0.513 77 m
Unit	Piede lip.
1 punto	= $\frac{1}{144}$
1 oncia	= $\frac{1}{12}$
1 canna	= 4
1 trabucco	= 6
1 miglio	= 4333 $\frac{1}{3}$

Mass

1 libbra	= 307 to 398 g
Unit	Libbra
1 grano	= $\frac{1}{912}$
1 denaro	= $\frac{1}{240}$
1 ottavo	= $\frac{1}{80}$
1 oncia	= $\frac{1}{12}$
1 rubbo	= 25
1 cantaro	= 150

Area

1 quadrao	} = 38 a
1 giornata	
1 tavola	= $\frac{1}{100}$ giornata

Capacity, dry

1 mine	= varies 12 to 120 l
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Capacity, liquid

1 barile da vino	= 45.6 l
1 barile da olio	= 33.4 l

Japan.—m.o. 1893. Before 1891, great diversity; since 1891, fundamental units defined by metric equivalents.

<i>Length</i>	
1 shaku*	$= \frac{1}{10}$ m
	$= 0.303\ 0303\ \text{m}$
Unit	Shaku
1 shi	$= 10^{-6}$
1 mō	$= 10^{-4}$
1 rin	$= 10^{-3}$
1 bu	$= 10^{-2}$
1 sun	$= 10^{-1}$
1 yabiki	$= 2.5$
1 hiro	$= 5$
1 ken	$= 6$
1 jō	$= 10$
1 chō	$= 360$
1 ri†	$= 12\ 960$
<i>Mass</i>	
1 kwan	$= \frac{1}{4}$ kg
	$= 3.75\ \text{kg}$
Unit	Kwan
1 shi	$= 10^{-7}$
1 mō	$= 10^{-6}$
1 rin	$= 10^{-5}$
1 fun	$= 10^{-4}$
1 candareen	$= 10^{-4}$
1 mommé	$= 10^{-3}$
1 niyo	$= 0.004$
1 hyaku-mé	$= 0.10$
1 kin	$= 0.16$
1 ninsoku-ichi-nin	$= 7$
1 kiyak-kin	$= 16$
1 karus hiri-ichi-da	$= 18$
1 komma-ichi-da	$= 40$
<i>Area</i>	
<i>(Land Measure)</i>	
1 bu	$= \frac{100}{30.25}\ \text{m}^2$
	$= 3.305\ 785\ 12\ \text{m}^2$
Unit	Bu
1 gō	$= 0.1$
1 tsubo	$= 1$
1 sé	$= 30$
1 tan	$= 300$
1 chō	$= 3000$
1 ri²	$= 46\ 656$
<i>Capacity</i>	
1 shō	$= \frac{1}{10}$ l
	$= 1.803\ 9068\ \text{l}$
	$= 64827\ \text{bu}^3$
Unit	Shō
1 shaku	$= 10^{-2}$
1 gō	$= 10^{-1}$
1 to	$= 10$
1 koku	$= 100$

Kanada v. Canada.

Kolumbien v. Columbia.

Kongo v. Congo.

* The old shaku (kujirajaku) = 1.25 shaku is legal for fabrics.

† One ri marin (kai-ri) = nautical ri.

Kuba v. Cuba.

Latvia.—m.o. Russian and local measures since 1845. Old measures were those of Holland.

<i>Length</i>	
1 elle	$= 0.537\ \text{m}$
1 quartier	$= \frac{1}{4}$ elle
1 meile	$= 7\ \text{verste}$
	(Russian)
	$= 7.468\ \text{km}$
<i>Mass</i>	
1 pfund	$= 419\ \text{g}$
For secondary units, see Esthonia.	
<i>Area</i>	
1 kapp	$= 1.4864\ \text{a}$
Unit	Kapp
1 pourvete	$= 25$
1 loofstelle	$= 35$
1 tonnstelle	$= 35$
<i>Volume</i>	
1 faden	$= 4.077\ \text{s}$
<i>Capacity</i>	
1 stoof	$= 1.2752\ \text{l}$
Unit	Stoof
1 kanne	$= 2$
1 kulmet	$= 9$
1 anker	$= 30$
1 poure	$= 54$
1 loof	$= 54$
1 tonne	$= 108$

Lettonie v. Latvia.

Luxemburg.—m.c. 1820. Previously used a local unit:

1 malter = 191 l.

Malacca.—

<i>Length</i>	
1 asta	$= 0.457\ \text{m}$
1 depa	$= 4\ \text{asta}$
1 jumba	$= 8\ \text{asta}$
<i>Mass</i>	
1 catty	$= 0.61\ \text{kg}$
Unit	Catty
1 miam	$= \frac{1}{3}$
1 buncal	$= \frac{1}{4}$
1 tampang	$= 1$
1 bedur	$= 2$
1 kip	$= 15$
1 pecul	$= 100$
1 bahar	$= 300$
<i>Area</i>	
1 jumba²	$= 13.38\ \text{m}^2$
1 orlong	$= 400\ \text{jumba}^2$
	$= 53.52\ \text{a}$
<i>Capacity</i>	
1 chupa	$= \text{ca. } 1\ \text{l}$
1 gantang	$= 4\ \text{chupa}$

Malaysia v. British India; v. Dutch East Indies.

Malta.—m.c. 1914. Older, British and local (old Sicilian):

<i>Length</i>	
1 foot	$= 0.2836\ \text{m}$
1 canna	$= 2.088\ \text{m}$
1 palmo	$= \frac{1}{8}$ canna
<i>Mass</i>	
1 rottolo	$= 1.75\ \text{lb. av.}$
	$= 0.793\ 79\ \text{kg}$
Unit	Rottolo
1 parto	$= \frac{1}{16}$
1 ounce	$= \frac{1}{8}$
1 cantaro	$= 100$
<i>Capacity</i>	
1 caffiso	$= 20.457\ \text{l}$
1 baril	$= 43.162\ \text{l}$
1 salma	$= 290.944\ \text{l}$
<i>Marokko v. Morocco.</i>	
<i>Mauritius and Seychelles</i>	
<i>Islands.</i> —m.c. Older = old French, British, and the following:	
<i>Capacity</i>	
1 cash	$= 227.11\ \text{l}$
1 velt	$= \frac{1}{8}$ cash
<i>Mexico.</i> —m.c. 1896; m.o. 1857. Older (from Spanish, Castillian), legally defined, during transition period, in terms of metric equivalents:	
<i>Length</i>	
1 vara	$= 0.838\ \text{m}$
Unit	Vara
1 linea	$= \frac{1}{16}$
1 pulgada	$= \frac{1}{8}$
1 pie	$= \frac{1}{3}$
1 legua	$= 5000$
<i>Mass</i>	
1 libra	$= 460.246\ 34\ \text{g}$
Unit	Libra
1 tomin	$= \frac{1}{16}$
1 adarme	$= \frac{1}{8}$
1 ochava	$= \frac{1}{4}$
1 onza	$= \frac{1}{2}$
1 arroba	$= 25$
1 quintal	$= 100$
1 tercio	$= 160$
<i>Area</i>	
1 fanega	$= 356.628\ \text{a}$
Unit	Fanega
1 caballeria	$= 12$
1 labor	$= 18$
1 sitio	$= 492.28$
<i>Capacity, dry</i>	
1 cuartillo	$= 1.8918\ \text{l}$
Unit	Cuartillo
1 almud	$= 4$
1 fanega	$= 48$
1 carga	$= 96$
<i>Capacity, liquid</i>	
1 cuartillo	$= 0.456\ 264\ \text{l}$
1 cuartillo for oil	$= 0.506\ 162\ \text{l}$
1 jarra	$= 18\ \text{cuartillos}$

Morocco.—m.o.; local, var.:

<i>Length</i>	
1 cubit	$= 0.533\ \text{m}$
1 canna	$= 0.533\ \text{m}$
1 pic	$= 0.61\ \text{m}$
1 tonni	$= \frac{1}{8}$ pic
<i>Mass</i>	
1 rotal	$= 507.5\ \text{g}$
1 artal	$= 3\ \text{kg}$
1 gerbe	$= 22\ \text{rotal}$
1 kula	$= 22\ \text{rotal}$
1 kantar	$= 100\ \text{rotal}$
<i>Capacity</i>	
1 sahh	$= 56\ \text{l}$
1 fanega	$= 14\ \text{l}$
1 mudd	$= 14\ \text{l}$
1 almude	$= 14\ \text{l}$
<i>Mozambique v. Portuguese East Africa.</i>	
<i>Netherlands.</i> —m.c. 1820, with the names:	
<i>Length</i>	
streep	$= \text{mm}$
duim	$= \text{cm}$
palm	$= \text{dm}$
elle	$= \text{m}$
roede	$= \text{dkm}$
mijle	$= \text{km}$
<i>Mass</i>	
korrel	$= \text{dg}$
wigtje	$= \text{g}$
lood	$= \text{dkg}$
once	$= \text{hg}$
pond	$= \text{kg}$
<i>Capacity, dry</i>	
maatje	$= \text{dl}$
kop	$= \text{l}$
schepel	$= \text{dkl}$
mudde	$= \text{hl}$
zak	$= \text{hl}$
last	$= 30\ \text{hl}$
<i>Capacity, liquid</i>	
vingerhoed	$= \text{cl}$
maatje	$= \text{dl}$
kan	$= \text{l}$
dekaliter	$= \text{dkl}$
vat	$= \text{hl}$

Old national system is more or less current in some of the old colonies:

<i>Length</i>	
<i>(Amsterdam)</i>	
1 roeden	$= 3.679\ 77\ \text{m}$
1 elle	$= 0.687\ 813\ \text{m}$
1 voeten	$= 0.283\ 0594\ \text{m}$
1 duime	$= 25.733\ \text{mm}$
1 lyne	$= 2.144\ \text{mm}$
<i>Mass</i>	
1 pond	$= 492.16772\ \text{g}$
1 pond*	$= 494.090\ 32\ \text{g}$

* Amsterdam.

Netherlands.—Cont'd.

1 pond (Apothecary)
= $\frac{3}{4}$ pond
= 369.126 g

Unit	Pond
1 mark	= $\frac{1}{2}$
1 unze	= $\frac{1}{16}$
1 drachme	= $\frac{1}{128}$
1 engel	= $\frac{1}{256}$
1 vierling	= $\frac{1}{1280}$
1 grein	= $\frac{1}{7680}$

Area

1 morgen = 81.244 346 a

Capacity, dry

1 schepel = 27.26 l

Unit	Schepel
1 kop	= $\frac{1}{8}$
1 vierd	= $\frac{1}{4}$
1 zak	= 3
1 mud	= 4
1 last	= 108

Capacity, liquid

1 mingelen = 1.200 to 1.237 l

Unit	Mingelen
1 vat	= 768
1 oxhoof	= 192
1 aam	= 128
1 anker	= 32
1 steekan	= 16
1 stoop	= 2
1 pint	= $\frac{1}{2}$
1 mutsje	= $\frac{1}{8}$

Nicaragua v. Costa Rica.

Niederlande v. Netherlands.

Northern Ireland v. Great Britain.

Norway.—m.c. 1882; m.o. 1879. Older differed very little from Danish; legal equivalents:

Length

1 fod = 0.3137 m

Mass

1 skaalpund = 0.4981 kg

Area

1 mal = 10 a

Capacity, dry

1 korntonde = 138.97 l

Capacity, liquid

1 pot = 0.9651 l

Oceania.—British measures.

Olanda v. Netherlands.

Österreich v. Austria.

Paësi Bási v. Netherlands.

Panama.—Metric compulsory.

Paraguay.—Metric almost exclusively used. m.o. 1899. Older = Spain; legal equivalents:

Length

1 vara (old) = 0.838 56 m

1 cuerda } = 83 $\frac{1}{2}$ vara = 69.88 m
1 cordel }

1 vara = 0.866 m

Unit Vara

1 piede = $\frac{1}{3}$

1 pouce = $\frac{1}{36}$

1 ligne = $\frac{1}{432}$

1 cuadra = 100

1 lieue = 5000

Mass

1 libra (old) = 460.08 g

1 libra = 459 g

Unit Libra

1 once = $\frac{1}{16}$

1 arrobo = 25

1 quintal = 100

1 tonne = 2000

Area

1 liño (old) = 48.832 a

1 liño = 100 vara²

1 liño = 75 m²

Capacity, dry

1 fanega = 288 l

1 almude = $\frac{1}{2}$ fanega

Capacity, liquid

1 frasco = 3.029 l

Unit Frasco

1 cuarta = $\frac{1}{4}$

1 barrel = 32

1 pipe = 192

Pays-Bas v. Netherlands.

Persia.—Metric is in process of adoption. By 1924 the following assimilation had occurred: 1 zar = 1 m, 1 dram = 1 g, 1 ralte = 1 l. National measures, provincial, var.; even today, in retail commerce, cereal grains are used as weights:

Length

1 guerze (common) = 0.63 to

0.97 m

= 1 monk-

elzer

1 zar = 1.04 m

Unit Zar

1 gireh = $\frac{1}{16}$

1 ouroub = $\frac{1}{8}$

1 charac = $\frac{1}{4}$

1 gez = 1

1 guerze } = 1

1 farsakh } = 6000

1 parasang }

Mass

1 miskal = 4.60 g

Unit Miskal

1 una = $\frac{1}{32}$

1 gandum } = $\frac{1}{16}$

1 grain }

1 abbas = $\frac{1}{16}$

Unit

1 nakhod } = $\frac{1}{4}$

1 carat } = $\frac{1}{8}$

1 dung = $\frac{1}{8}$

1 dartung = 0.22

1 dirhem = 2

1 sir = 16

1 pinar = 20

1 danar = 40

1 abbassi = 80

1 rottel = 100

1 tcheirek = 160

1 saddirham = 320

1 batman (Tauris) = 640

1 batman (Shirez) = 1280

1 batman = 600 to

1000

1 karvar = 100 bat-

man

Area

1 jerib = 1082 m² to 1153 m²

= 1000 to 1066 zar²

Capacity

1 chenica = 1.32 l

Unit Chenica

1 sextario = 0.25

1 capichas = 2

1 sabbitha = 5.5

1 colluthun = 6.25

1 legana = 30

1 artaba = 50

Peru.—m.c. 1869. Older

(from Spanish, Castillian):

Length

1 vara = 0.835 98 m

Mass

1 libra = 460.09 g

Unit Libra

1 arroba = 25

1 quintal = 100

1 fanega = 140

Area

1 topo = 27.06 a

1 fanegada = 64.596 a

Philippine Islands.—m.c.

1860. Older = Spain. Local:

Mass

1 catty = about 600 g

Unit Catty

1 punto = $\frac{1}{2}$

1 chinanta = 10

1 lachsa = 48

1 caban = 97

1 pecul = 100

Area

1 balita = 27.95 a

Unit Balita

1 loan = 0.1

1 quignon = 10

Capacity

1 kaban = 99.90 l

1 chupa = 3.75 cm³

1 ganta = $\frac{1}{16}$ kaban

1 apatan = $\frac{1}{4}$ chupa

Poland.—Metric in process of adoption; in some provinces it has been in use since 1872. Russian system legalized in 1849, without displacing national measurements. Since 1819 these have been defined by their metric equivalents. National:

Length

1 stopa = 0.288 m

Unit Stopa

1 linja = $\frac{1}{14}$

1 cal = $\frac{1}{12}$

1 lokiec = 2

1 sazen = 6

1 pret = 15

Old measures

1 pied (Warsaw) = 0.2978 m

1 pied (Cracow) = 0.3564 m

1 aune = 0.620 m

Mass

1 funt = 405.504 g

Unit Funt

1 gran = $\frac{1}{16}$

1 skrupul = $\frac{1}{4}$

1 drachma = $\frac{1}{16}$

1 lut = $\frac{1}{8}$

1 uncja = $\frac{1}{16}$

1 kamian = 25

1 centnar = 100

Old measures

1 funt = 404 g

1 centner = 16 funt

1 stein = 3.2 funt

Area

1 pret² = 18.6624 m²

1 morga = 300 pret²

1 wloka = 9000 pret²

Capacity

1 kwarta = 1 l

Unit Kwarta

1 kwarterka = $\frac{1}{4}$

1 garniec = 4

1 cwiere = 32

1 korzec = 128

Porto Rico.—m.c. 1860.

Older = Spain:

Area

1 cuerdo = 2250 vara²

= 15.72 a

Portugal.—m.c. 1872; m.o.

1852. Older:*

Length

1 pe = 0.3285 m

1 estadio = 258 m

1 milha = 8 estadio

1 legoa = 24 estadio

* In some of the older colonies the old Portuguese system, more or less modified, is still in use.

Unit	Pe
1 linha	= $1\frac{1}{4}$
1 pollegada	= $\frac{1}{2}$
1 palmo	= $\frac{3}{8}$
1 covada	= 2
1 vara	= $1\frac{1}{8}$

Mass

1 libra*	= 459 g
Unit	Libra
1 grao	= $5\frac{1}{2}$
1 escrupulo	= $3\frac{1}{4}$
1 outava	= $1\frac{1}{8}$
1 onca	= $\frac{1}{8}$
1 marco	} = $\frac{1}{2}$
1 meio	
1 arratel	= 1
1 arroba	= 32
1 quintal	= 128

Area

1 vara ²	= 1.2 m ²
Unit	Vara ²
1 ferrado	= 605
1 geira	= 4840

Capacity, dry

1 fanga	= 54 l
Unit	Fanga
1 outava	= $\frac{1}{8}$
1 quarto	= $\frac{1}{4}$
1 meio	= $\frac{1}{2}$
1 alqueira	= $\frac{1}{4}$
1 moio	= 15

Capacity, liquid

1 almude	= 16.5 l
Unit	Almude
1 quartillo	= $\frac{1}{8}$
1 meio	= $\frac{1}{4}$
1 canada	= $\frac{1}{2}$
1 alqueira	= $\frac{1}{4}$
1 bota	} = 26
1 pipa	
1 tonelada	= 52

Portuguese Colonies.—Metric compulsory.

Portuguese East Africa (Mozambique).—m.c. 1910. Older, mainly of Portugal; one bahar is considered equivalent to 109 kg.

Prussia v. Germany.

Rumania.—m.c. 1884; m.o. 1866. In old Bessarabia, Russian measures replaced by metric in 1922. Older:

Length

1 halibiu	= 0.701 m
1 endere	= 0.662 m
1 stringene	= 1.96 m

Mass

1 cantar	= ca. 56 kg
1 oke	= $\frac{1}{4}$ cantar

* For drugs 1 libra = $\frac{1}{2}$ libra = 344.25 g.

Capacity

1 dimerla	= 24.6 l
Unit	Dimerla
1 oke	= $\frac{1}{8}$
1 mirze	= 8
1 kilo	= 16

Capacity, liquid

1 viacka	= 14.15 l
1 oke	= 0.1 viacka

Russia.—m.o. 1900. Definitions of fundamental national units: *Length*: Archine is distance at 17°C between the axes of two lines drawn on the platinum-iridium prototype marked "H 1894." *Mass*: Fount is mass of the platinum-iridium prototype marked "H 1894." *Capacity, liquid*: Vedro is volume of 30 founts of pure water at 16 $\frac{2}{3}$ °C. *Capacity, dry*: Garnetz is $\frac{1}{15}$ vedro.

Length

1 archine	= 0.711 200 m
1 totchka	= 0.254 0000 mm

Unit	Totchka
1 ligne	= 10
1 paletz	= 50
1 sotka	= 84
1 duïme	= 100
1 verchoc	= 175
1 foute	= 1200
1 archine	= 2800

Mass (1) Ordinary

1 fount	= 409.51241 g
1 doli	= 44.434 9403 mg

Unit	Doli
1 sol	} = 96
1 zolotnik	
1 lote	= 288
1 once	= 576
1 lana	= 768
1 fount	= 9216

Unit	Fount
1 poud	= 40
1 berkovets	= 400
1 tonne marine	= 2400

Mass (2) For drugs

Unit	Doli
1 grain	= 1.4
1 scrupule	= 28
1 drachme	= 84
1 once	= 672
1 livre	= 8064

Area

1 archine ²	= 0.505 8054 m ²
1 ligne ²	= 6.451 600 mm ²

Unit *Ligne²*

1 duïme ²	= 100
1 verchoc ²	= 306.25
1 foute ²	= 14 400
1 archine ²	= 78 400

Unit *Archine²*

1 sagène ²	= 9
1 déciatine	= 21 600
1 verste ²	= 2 250 000

Volume

1 archine ³	= 0.359 7288 m ³
1 ligne ³	= 16.387 06 mm ³

Unit *Ligne³*

1 duïme ³	= 1000
1 verchoc ³	= 5359.375
1 foute ³	= 1 728 000
1 archine ³	= 21 952 000

Unit *Archine³*

1 sagène ³	= 27
1 tonne marine	= 7.871 72
1 last marin	= 15.743 44

Capacity, dry

1 garnetz	= 3.279 842 l
1 tchast	= 0.109 328 07 l

Unit *Tchast*

1 polougarnetz	= 15
1 garnetz	= 30
1 lof	= 592

Unit *Garnetz*

1 tchetverik	= 8
1 polouosmina	= 16
1 osmina	= 32
1 tchetvert	= 64

Capacity, liquid

1 vedro	= 12.299 41 l
1 tcharka	= 0.122 9941 l

Unit *Tcharka*

1 chkalik	= 0.5
1 bottle (vodka)	= 5
1 bottle (wine)	= 6.25
1 krouchka	= 10
1 shtoff	= 12.5
1 vedro	= 100

Unit *Vedro*

1 stekar	= 1.5
1 anker	= 3
1 pipe	= 36
1 fass	} = 40
1 botchka	

Salvador v. Costa Rica.

Schottland v. Great Britain.

Schweden v. Sweden.

Schweiz v. Switzerland.

Scotland, Scozia v. Great Britain.

Serbie-Croatie-Slovénie v. Yugoslavia.

Seychelles Islands v. Mauritius.

Siam.—m.c. 1923; m.o. 1889.

Older now defined by metric equivalents; those of transition period:

Length

1 wah	= 2 m
Unit	Wah

1 anukabiet	= $7\frac{1}{8}$
1 kabiet	= $3\frac{1}{4}$
1 niou	= $\frac{1}{8}$
1 keup	= $\frac{1}{8}$
1 sawk	} = $\frac{1}{4}$
1 sock	
1 ken	= $\frac{1}{2}$
1 sen	= 20
1 roeneng	= 2000
1 yote	= 8000

Mass

1 tchang*	= 1200 g
Unit	Tchang

1 klom	= $10\frac{1}{4}$
1 klam	= $5\frac{1}{2}$
1 pai	= $2\frac{1}{2}$
1 sompay	} = $1\frac{1}{8}$
1 grani	
1 fuang	= $\frac{1}{8}$
1 salung	= $\frac{1}{8}$
1 baht	= $\frac{1}{8}$
1 tamlung	= $\frac{1}{8}$
1 doon	= 20
1 hap	= 50
1 bara	= 400

Area

1 wah ²	= 4 m ²
1 ngan	= 100 wah ²
1 rai	= 400 wah ²

Capacity

1 tanan†	= 1 l
Unit	Tanan

1 niou	= $1\frac{1}{8}$
1 chai meu	= $\frac{1}{4}$
1 kam meu	= $\frac{1}{8}$
1 laang	} = $\frac{1}{2}$
1 chang awn	
1 kanahn	= 1
1 sat	= 20
1 tang	= 40
1 tamlaum	= 400
1 seste	= 800
1 ban	= 1600
1 kwien	} = 2000 or 3200
1 koyan	
1 cohi	= 32 000

Siria v. Syria.

Somaliland.—m.o.; local, vary with material and province:

Length

1 top	= 3.92 m
1 cubito	= $\frac{1}{2}$ top

Mass

1 rottolo	= 448 g
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* Previously, 1 tchang = 600 to 1300 g.

† Previously, 1 tanan = 0.9 to 1.2 liter.

Somaliland.—Cont'd.

Unit	Rottolo
1 okia	= $\frac{1}{16}$
1 frasla	= 36
1 gisla	= 360

Area

1 darat = 80 a

Capacity, dry

1 chela = 1.359 l

Unit Chela

1 tabla = 15
1 gisla = 120

Capacity, liquid

1 caba = 0.453 l

Soudan v. Sudan.

South Africa v. Union of
South Africa

Spain.—m.c. 1860. Older,*
var., provincial; Castilian:

Length

1 vara = 0.835 905 m

(Other vara comprised be-
tween 0.768 m and 0.912 m)

Unit	Vara
1 punto	= $\frac{1}{16}$
1 linea	= $\frac{1}{8}$
1 diedo	= $\frac{1}{4}$
1 pulgada	= $\frac{1}{2}$
1 sesma	= $\frac{1}{3}$
1 palma	= $\frac{1}{2}$
1 pie	= $\frac{1}{2}$
1 codos	= $\frac{1}{2}$
1 passo	= $\frac{1}{2}$
1 estado	= 2
1 estadal	= 4
1 milla†	= 1666 $\frac{2}{3}$
1 legua	= 5000 or 8000

Mass

1 libra = 460.093 g

(Other libra comprised be-
tween 350 g and 575 g)

Unit	Libra
1 grano	= $\frac{1}{16}$
1 arienzo	= $\frac{1}{8}$
1 tomin	= $\frac{1}{4}$
1 dinero	= $\frac{1}{2}$
1 adarme	= $\frac{1}{2}$
1 dracma	= $\frac{1}{2}$
1 ochava	= $\frac{1}{2}$
1 character	= $\frac{1}{2}$
1 escrupulo	= $\frac{1}{2}$
1 onza	= $\frac{1}{2}$
1 marco	= $\frac{1}{2}$
1 arroba	= 25
1 barril	= 50
1 quintal	= 100
1 quintalmacho	= 150
1 tonelada	= 2000

* Old national system, more or less
modified, is still in use in the old
Spanish colonies.

† Milla = 5000 pie.

Area

1 vara² = 0.698 7372 m²

Unit	Vara ²
1 cuartilla	= 25
1 calemin	= 768
1 aranzada	= 6400
1 fanega	= 9216
1 fanegada	= 9216
1 yugada	= 460 800

Capacity, dry

1 fanega = 55.501 l

Unit	Fanega
1 ochavillo	= $\frac{1}{16}$
1 racion	= $\frac{1}{8}$
1 cuartillo	= $\frac{1}{4}$
1 medio	= $\frac{1}{2}$
1 calemin	= $\frac{1}{2}$
1 almude	= $\frac{1}{2}$
1 cuartilla	= $\frac{1}{2}$
1 cahiz	= 12

Capacity, liquid

(Arroba was defined as vol-
ume of 34 libra of river water.
The arroba for oil was volume
of 25 libra of oil)

1 arroba (wine) = 16.133 l
1 arroba (oil) = 12.563 l

Unit	Arroba
1 copas	= $\frac{1}{16}$
1 quarterone	= $\frac{1}{16}$
1 panilla*	= $\frac{1}{16}$
1 libra	= $\frac{1}{16}$
1 cuartillo	= $\frac{1}{8}$
1 azumbre	= $\frac{1}{8}$
1 cuartilla*	= $\frac{1}{4}$
1 cantara	= 1
1 moio	= 16
1 pipa	= 27
1 bota	= 30

Stati Uniti v. United States.

Straits Settlements v. British

India.

Sud-Africaine, Union v.

Union of South Africa.

Sudan.—Egyptian in use.

Suède v. Sweden.

Suisse v. Switzerland.

Svézia v. Sweden.

Svizzera v. Switzerland.

Sweden.—m.c. 1889; m.o.
1879. Older:

Length

1 fot = 0.296 90 m

Unit	Fot†
1 linie	= $\frac{1}{16}$
1 tum	= $\frac{1}{8}$
1 alm	= 2
1 famm	= 6
1 stang	= 16
1 ref	= 100 or 160
1 mil	= 18 000

* Oils.

† The fot is also divided into deci-
mals.

Mass

1 skålpund = 425.076 g

Unit	Skålpund
1 as	= $\frac{1}{16}$
1 quintin	= $\frac{1}{16}$
1 lod	= $\frac{1}{16}$
1 untz	= $\frac{1}{16}$
1 lispund	= 20
1 sten	= 32
1 centner	= 100 or 120
1 waag	= 165
1 skeppund	= 400
1 nyläst	= 12 000

Area

1 fot ²	= 0.088 149 61 m ²
1 kappland	= 1.542 618 17 a
1 ref ²	= 8.814 961 a
1 tunland	= 49.363 781 6 a
	= 56 000 fot ²

Capacity, dry

1 kanna = 2.617 l

Unit	Kanna
1 ort	= $\frac{1}{16}$
1 junkfra	= $\frac{1}{16}$
1 quarter	= $\frac{1}{8}$
1 stop	= $\frac{1}{4}$
1 kappar	= $\frac{1}{2}$
1 fjerdingar	= 7
1 spanna	= 28
1 tunna	= 56
1 koltunna	= 63
1 kolläst	= 756

Capacity, liquid

1 kanna = 0.1 fot³
= 2.617 162 l

Unit	Kanna
1 jungfrur	= $\frac{1}{16}$
1 jungfer	= $\frac{1}{16}$
1 quarter	= $\frac{1}{8}$
1 stop	= $\frac{1}{4}$
1 ankar	= 15
1 eimer	= 30
1 am	= 60
1 ohm	= 60
1 oxhufud	= 90
1 oxhoft	= 90
1 pipe	= 180
1 fuder	= 360

Switzerland.—m.c. 1877;
m.o. 1868. Older, var.; during
transition were fixed as follows:

Length

1 pied } = 30 cm
1 fuss }

Unit	Pied
1 ligne	= $\frac{1}{16}$
1 linie	= $\frac{1}{16}$
1 pouce	= $\frac{1}{2}$
1 zoll	= $\frac{1}{2}$
1 aune	= 2
1 elle	= 2
1 toise	= 6
1 ruthe	= 6

Unit Pied

1 perche = 16
1 lieue = 16 000

Mass (1) Ordinary

1 livre = 500 g

Unit	Livre
1 loth	= $\frac{1}{16}$
1 once	= $\frac{1}{16}$

Mass (2) For medicine

1 livre = 375 g

Unit	Livre
1 grain	= $\frac{1}{16}$
1 scruple	= $\frac{1}{16}$
1 drachme	= $\frac{1}{16}$
1 once	= $\frac{1}{16}$

Syria.—m.o.; current:

Length

1 pic = 0.582 m

Mass

1 rottolo = 1785 g

Unit	Rottolo
1 drachme	= $\frac{1}{16}$
1 pesi	= $\frac{1}{16}$
1 metecali	= $\frac{1}{16}$
1 mitcal	= $\frac{1}{16}$
1 once	= $\frac{1}{16}$
1 zurbo	= 27.5
1 cola	= 35
1 cantar	= 100

Capacity

1 rotl = 3.2 l

Unit	Rotl
1 makuk	= 250
1 garava	= 450

Tchéco-Slovaquie v. Czecho-
slovakia.

Tonkin.—Same as Anam
(q.v.)

Tripoli and Cyrenaica.—m.o.,
current defined by metric equi-
valents:

Length

1 pik = 0.68 m
= 1 handaze
1 palmo = $\frac{1}{3}$ pik
1 draa = 0.46 m

Mass

1 rottolo = 512.8 g
1 oka { = 2.5 rottolo
= 1282 g
1 metical = 4.76 g

Unit	Rottolo
1 kharouba	= $\frac{1}{16}$
1 dram	= $\frac{1}{16}$
1 termino	= $\frac{1}{16}$
1 uckin	= $\frac{1}{16}$
1 mattaro	= 42
1 cantar	= 100

Area

1 pik² = 0.4624 m²

Unit	Pik ²
1 denum	= 1600
1 jabia	= 1800
<i>Capacity, dry</i>	
1 orba	= 7.6 l
Unit	Orba
1 nufisorbah	= $\frac{1}{2}$
1 temen	= 4
1 ueba	= 16
(Measured by weight)	
1 oka	= 1282 g
1 marta	= 11 to 14 oka
1 kele	= 2 marta
<i>Capacity, liquid</i>	
1 barile	= 64.8 l
1 bozze	= $\frac{1}{2}$ barile
(Measured by weight)	
1 oka	= 1282 g
Unit	Oka
1 gorraf	= 9.75
1 giarra	= 58.5
Tschechoslovak v. Czechoslovakia.	
Tunis.—m.c. 1895. Current:	
<i>Length</i>	
1 pic arabe	= 48.8 cm
1 pic ture	= 63.7 cm
1 pic endazé	= 67.3 cm
The pic used depends upon the object measured.	
<i>Mass</i>	
1 uckir	= 31.495 g
Unit	Uckir
1 rottolo attari	= 16
1 rottolo sucki	= 18
1 rottolo khaddari	= 20
1 cantaro	= 100
<i>Capacity</i>	
1 cafisso	= 496 l
1 millerole (Marseilles)	= ca. 64 l
Unit	Cafisso
1 saah	= $\frac{1}{16}$
1 whiba	= $\frac{1}{16}$
Turkestan.	
<i>Length</i>	
1 hasch	= 0.7112 m
Unit	Hasch
1 archine*	= 1
1 altschin	= 1
<i>Mass</i>	
1 batman	= 125 kg to 128 kg
Unit	Batman
1 sir	= $\frac{1}{8}$
1 tscharik	= $\frac{1}{8}$
1 mintscha	= $\frac{1}{8}$
Turkey.—m.o.; current, var.:	
* Russian.	

<i>Length</i>	
1 archine	= 64 to 76 cm
1 archine (for architecture)	= 75.77 cm
1 nul	= 1 km
Unit	Archine
1 nocktat	= $\frac{1}{8}$
1 hatt	= $\frac{1}{8}$
1 parmack	= $\frac{1}{8}$
1 ouomb	= $\frac{1}{8}$
1 pic	= 1
<i>Mass</i>	
1 oka	= 1283 g
Unit	Oka
1 karat	= $\frac{1}{100}$
1 denke	= $\frac{1}{100}$
1 dirhem	= $\frac{1}{100}$
1 drachme	= $\frac{1}{100}$
1 miskal	= $\frac{1}{100}$
1 cequi	= $\frac{1}{100}$
1 yusdrum	= $\frac{1}{100}$
1 rottel	= 0.44
1 batman	= 6
1 kantar	= 44
1 tcheki	= 176 to 195
<i>Area</i>	
1 deunum	= 1600 archine ²
1 djeril	= 913 m ²
1 djeril	= 100 a
<i>Capacity</i>	
1 kile	= 32 to 43 l
1 zira ³	= 0.435 m ³
Unit	Kile
1 chinik	= $\frac{1}{4}$
1 fortin	= 4
Ungarn, Ungheria v. Hungary.	
Union of South Africa.—Metric, British, and old Dutch:	
<i>Length</i>	
1 elle	= 0.685 m
<i>Mass</i>	
1 bundle	= 3175 g
<i>Area</i>	
1 morgen	= 85.5 a
<i>Capacity</i>	
1 gantang	= 9.2 l
1 balli	= 5 gantang
1 muid	= 109.1 l
1 legger	= 516 l
Unit	Legger
1 kanne	= $\frac{1}{8}$
1 ahm	= $\frac{1}{4}$
United States of America.—m.o. 1866; m.c. for certain governmental purposes. Fundamental units of national system are defined in terms of metric units. For less common and obsolescent units, see Great Britain.	

<i>Length</i>	
1 yard (yd.)	= $\frac{3}{4}$ m
	= 0.914 401 83 m
1 foot (ft.)	= $\frac{1}{3}$ yd.
	= 30.480 061 cm
1 inch (in.)	= $\frac{1}{36}$ yd.
	= 2.540 005 08 cm
Unit	Inch
1 mil	= 0.001
1 hand	= 4
1 span	= 9
1 foot	= 12
1 yard	= 36
Unit	Foot
1 fathom	= 6
1 rod	= 16.5
1 pole	
1 perch	= 66
1 chain* (Gunther's)	
1 chain* (engineer's)	= 100
1 bolt	= 120
1 furlong	= 660
1 cable length	= 720
1 mile (statute)	= 5280
1 mile (nautical)†	= 6080.20
1 league (statute)	= 3 st. mile
1 league (nautical)	= 3 n. mile
<i>Mass</i>	
1 pound avoirdupois (lb. av.)	= 453.592 4277 g
	= 7000 grain (gr.)
1 grain	= 64.798 918 24 mg
(Three systems: avoirdupois, troy, apothecary.)	
<i>Avoirdupois (av.)</i>	
(General use)	
Unit	Pound
1 dram (dr.)	= $\frac{1}{16}$
1 ounce (oz.)	= $\frac{1}{8}$
1 hundred-weight (cwt.) (long)	= 112
1 ton (short) (sh. tn.)	= 2000
1 ton (long) (l. tn.)	= 2240
<i>Troy (t.)</i>	
(For precious metals)	
Unit	Grain
1 pennyweight (dwt.)	= 24
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760
<i>Apothecary (ap.)</i>	
(For dispensing drugs)	
Unit	Grain
1 scruple (s. or \mathfrak{S})	= 20
1 dram (dr. or \mathfrak{D})	= 60
1 ounce (oz. or \mathfrak{Z})	= 480
1 pound (lb.)	= 5760
* 1 link = 0.01 chain.	
† 1 nautical mile = 1853.249 m	

<i>Area</i>	
1 inch ² (sq. in.)	= 6.451 6258 cm ²
1 foot ² (sq. ft.)	= 929.0341 cm ²
1 yard ² (sq. yd.)	= 0.836 130 71 m ²
1 acre (A.)	= 4046.873 m ²
Unit	Foot ²
1 inch ²	= $\frac{1}{144}$
1 yard ²	= 9
Unit	Yard ²
1 rod ² (sq. rd.)	= 30.25
1 perch	
1 chain ² *	= 484
1 rood	= 1210
1 acre (A.)	= 4840
Unit	Acre
1 mile ² (sq. mi.)	= 640
1 township†	= 23 040
<i>Volume</i>	
1 yard ³ (cu. yd.)	= 0.764 559 45 m ³
1 foot ³ (cu. ft.)	= 28 317.0 cm ³
1 inch ³ (cu. in.)	= 16.387 162 cm ³
Unit	Foot ³
1 inch ³	= $\frac{1}{1728}$
1 board foot (bd. ft.)	= $\frac{1}{12}$
1 yard ³	= 27
1 shipping ton	= 40
1 register ton	= 100
1 cord (cd.)	= 128
<i>Capacity, dry</i>	
1 bushel (bu.)	= 2150.42 inch ³
	= 35.238 329 l
Unit	Bushel
1 pint (pt.)	= $\frac{1}{4}$
1 quart (qt.)	= $\frac{1}{2}$
1 peck (pk.)	= $\frac{1}{4}$
1 barrel† (bbl.)	= 3.281
1 chaldron§	= 36
1 firkin	= 9 gallon
<i>Capacity, liquid</i>	
1 gallon (gal.)	= 231 inch ³
	= 3.785 332 l
1 minim (min. or m)	= $\frac{1}{155.349}$ gal.
	= 0.061 6102 ml
Unit	Minim
1 fluid dram (fl. dr.)	= 60
1 fluid ounce (fl. oz.)	= 480
1 gill (gi.)	= 1920
* Gunther's chain.	
† 36 mile ² .	
‡ For dry commodities, except cranberries, barrel = 7056 inch ³ ; cranberry barrel = 5826 inch ³ ; lime barrel contains 180 lb. av. or 280 lb. av.; by custom, flour barrel = 196 lb. av.	
§ Variable.	

United States.—Cont'd.

Unit	Gallon
1 gill (gi.)	$= \frac{1}{8}$
1 pint (pt.)	$= \frac{1}{4}$
1 quart (qt.)	$= \frac{1}{2}$
1 barrel*	$= 31.5$
1 hogshead	$= 63$

Uruguay.—m.c. 1894; m.o. 1866. Older = Spain (Castilian), more or less modified.

Venezuela.—m.c. 1914; m.o. 1857. Older = Spain (Castilian), more or less modified, and the following of Granada:

Length	
1 vara	$= 0.8$ m
1 meile	$= 6280$ vara

Mass	
1 libra	$= 1$ kg
1 bag	$= 62.5$ kg

Vereinigste Staaten v. United States.

Württemberg v. Germany
Yugoslavia.—m.c. 1883.
Older:

Length	
1 linija	$= 21.95$ mm
1 palaz	$= 36.34$ mm
1 archine	$= 660$ mm to 712 mm
1 khvat	$= 1.896$ m
1 stopa	$= \frac{1}{6}$ kvat

Mass	
1 oka	$= 1280$ g

Unit	Oka
1 dram	$= \frac{1}{100}$
1 satliik	$= \frac{1}{4}$
1 litra	$= \frac{1}{2}$
1 akov	$= 40$
1 tovar	$= 100$

Area	
1 stopa ²	$= 998.56$ cm ²
Unit	m ²
1 dunum	$= 700$
1 motyka	$= 800$
1 raliza	$= 2500$
1 dan oranja	$= 3597$
1 lanaz	$\left\{ \begin{array}{l} = 5760 \\ = 1600 \text{ khvat}^2 \end{array} \right.$

Capacity	
(Liquids are measured by weight.)	

Unit	Feddan
1 achir	$\left\{ \begin{array}{l} = \frac{1}{100} \end{array} \right.$
1 qasaba	$\left\{ \begin{array}{l} = \frac{1}{100} \end{array} \right.$
1 qamha	$= \frac{1}{8}$
1 habbah	$= \frac{1}{2}$
1 cafiz	$= \frac{1}{100}$
1 qirat	$= \frac{1}{4}$
1 daneq	$= \frac{1}{4}$
1 djarib	$= \frac{1}{4}$

Capacity	
(Measured by weight)	

Unit	Cafiz
1 mudd	$= \frac{1}{100}$
1 kiladja	$\left\{ \begin{array}{l} = \frac{1}{100} \end{array} \right.$
1 caphite	$\left\{ \begin{array}{l} = \frac{1}{100} \end{array} \right.$
1 kist	$\left\{ \begin{array}{l} = \frac{1}{100} \end{array} \right.$
1 saa	$= \frac{1}{100}$
1 makuk	$= \frac{1}{100}$
1 ferk	$= \frac{1}{100}$
1 woëbe	$= \frac{1}{100}$
1 khoull	$= \frac{1}{100}$
1 modius	$= 1\frac{1}{2}$
1 artabe	$= 2$
1 amphora	$= 2$
1 gariba	$= 8$
1 den	$= 8$

Assyro-Chaldean-Persian System.

Length	
1 foot	$= 0.320$ m
Unit	Foot
1 finger	$= \frac{1}{8}$
1 palm	$= \frac{1}{4}$
1 zereth	$= 1$
1 cubit	$= 2$
1 pace	$= 6$
1 qasab	$\left\{ \begin{array}{l} = 12 \end{array} \right.$
1 cane	$\left\{ \begin{array}{l} = 12 \end{array} \right.$
1 chebel	$= 80$
1 stadion	$\left\{ \begin{array}{l} = 720 \end{array} \right.$
1 ghalva	$\left\{ \begin{array}{l} = 5400 \end{array} \right.$
1 mille	$= 5400$
1 parasang	$= 20\,000$
1 schoëme	$= 21\,600$
1 stathmos	$\left\{ \begin{array}{l} = 80\,000 \end{array} \right.$
1 mansion	$\left\{ \begin{array}{l} = 80\,000 \end{array} \right.$

Mass	
1 talent	$= 32.6$ kg
(Talent divided into 50, 60 or 100 mina)	
1 drachma	$= 0.01$ mina

Area	
1 gar	$\left\{ \begin{array}{l} = 14.7 \text{ m}^2 \\ = 144 \text{ foot}^2 \end{array} \right.$
Unit	Gar
1 dizaine	$= 10$
1 gan	$= 100$
1 gur	$= 1000$

Capacity	
(Measured by weight)	
1 amphora	$= 32.6$ kg
Unit	Amphora
1 cados	$= \frac{1}{100}$
1 makuk	$= \frac{1}{100}$
1 woëbe	$= \frac{1}{100}$
1 modius	$= \frac{1}{2}$
1 small artaba	$= 1\frac{1}{2}$
1 large artaba	$= 2$
1 large amphora	$= 3$
1 gariba	$= 8$

Egypt: System of the Pharaohs.

Length	
1 pied	$= 0.349$ m
Unit	Pied
1 doigt, finger	$= \frac{1}{8}$
1 theb	$= \frac{1}{8}$
1 palme	$= \frac{1}{4}$
1 choryos	$= \frac{1}{4}$
1 dichas	$= \frac{1}{4}$
1 spithame	$= \frac{1}{4}$
1 pied royal	$= 1$
1 zereth	$= 1$
1 pigon	$= 1\frac{1}{2}$
1 coudée royale	$= 1\frac{1}{2}$
1 derah	$= 1\frac{1}{2}$
1 coudée longue	$= 2$
1 pas	$= 2\frac{1}{2}$
1 xilon	$= 4\frac{1}{2}$
1 orgye	$= 6$
1 canne	$= 11\frac{1}{2}$
1 senus	$= 150$
1 stade	$= 500$ or 600
1 mille	$= 5000$
1 atour vulgaire	$= 15\,000$
1 schoëme	$= 18\,000$
1 parasange	$= 20\,000$
1 atour royal	$= 30\,000$

Mass	
1 mine	$= 850$ g
Unit	Mine
1 gerah	$= \frac{1}{1000}$
1 sicile	$= \frac{1}{100}$
1 kikkar	$= 50$
1 talent	$= 50$

Area	
1 pekeis	$= 27.405$ m ²
Unit	Pekeis
1 coudée ²	$= \frac{1}{100}$
1 sù	$= 6.25$
1 dizaine	$= 10$
1 rema	$= 50$
1 aurure	$= 100$
1 aroure	$= 100$
1 setta	$= 1000$

C. SYSTEMS OF ANTIQUITY

Our knowledge of the measures of antiquity is derived from the texts and monuments which have persisted to modern times, and some actual standards which have come down to us. The latter enable us to establish quite exact equivalence between the measures which they represent and ours. But most frequently such equivalence is only very roughly known, or is actually unknown. In this section are given only the more important or the best studied of these systems. The values given must not be taken too literally. Indeed, especially in antiquity, systems do not succeed one another; they evolve. Several may coexist among a single people; it is generally impossible to fix the dates at which these systems were used. The ancients had no capacity measures, such as ours; they weighed liquids and grains in terms of standards forming a second system of weights.

Arabian System.	
Length	
1 foot	$= 0.320$ m
Unit	Foot
1 assbaa (finger)	$= \frac{1}{8}$
1 cabda (palm)	$= \frac{1}{4}$
1 cubit (new)	$= 1\frac{1}{2}$
1 cubit†	$= 2$
1 orgye (pace)	$= 6$
1 qasab	$= 12$
1 seir	$= 600$
1 ghalva	$= 720$
1 mille	$= 6000$
1 parasang	$= 18\,000$
1 barid	$= 72\,000$
1 veredus	$= 72\,000$
1 marhala	$= 144\,000$
Mass	
(So-called system of the Prophet)	
1 rotl	$= 340$ g
Unit	Rotl
1 dirhem	$= \frac{1}{100}$
1 nevat	$= \frac{1}{4}$
1 nasch	$= \frac{1}{8}$
1 oukia	$= \frac{1}{4}$
1 man	$= 2$
1 mine	$= 4$
1 ocque	$= 4$
1 qanthar	$= 100$
1 kikkar	$= 125$
Area	
1 feddan	$= 14\,400$ cubit ² †
	$= 59$ a

* Wine barrel.
† Hachemic.

<i>Capacity</i> (Measured by weight)	
1 khar	= 34 kg
Unit	Khar
1 outen	= $\frac{1}{100}$
1 man	}
1 mine	
1 hecte	= $\frac{1}{8}$
1 apt	= $\frac{1}{4}$
1 keramion	= 1
1 metretes d'Héron	= $\frac{1}{4}$
1 artabe des septante	= $\frac{1}{2}$
1 artabe	}
1 letech	
	= $4\frac{7}{8}$

Greek System.

<i>Length</i>	
1 pous* = 0.308 56 m	
Unit	Pous
1 daktylos (finger)	= $\frac{1}{16}$
1 condylos	= $\frac{1}{8}$
1 palestra (palm)	= $\frac{1}{4}$
1 dichas	= $\frac{1}{2}$
1 spithame (span)	= $\frac{3}{4}$
1 cubit†	= $1\frac{1}{2}$
1 Grecian cubit	= 2
1 bema (pace)	= $2\frac{1}{2}$
1 orgyia	= 6
1 amma (corde)	= 60
1 plethron	= 100
1 stadion	= 600
1 mille	= 4500
1 kiloorgyia	= 6000

Mass

1 mina	= 425 g
Unit	Mina
1 chalque	= $\frac{1}{4800}$
1 obol	= $\frac{1}{60}$
1 diobol	= $\frac{1}{360}$
1 drachma	= 0.01
1 tetradrachma	= 0.04
1 talent	= 60

Area

1 pous ²	= 0.095 209 m ²
Unit	Pous ²
1 dekapode ²	= 100
1 plethron ²	= 10 000

Capacity

(Measured by weight)

1 chenica	= 816 g
Unit	Chenica
1 cyanthos	= $\frac{1}{24}$
1 oxybaphon	= $\frac{1}{16}$
1 cotyle	= $\frac{1}{4}$
1 sexte	= $\frac{1}{2}$

* The Olympic foot of Egyptian origin.

† Lapidary.

Unit	Chenica
1 maris	= 2
1 chothas	= 3
1 hemiektos	= 4
1 hektos	}
1 modius	
1 metretes	= 36
1 medimnos	= 48

Hebrew System.*Length*

1 sacred cubit	= 0.640 m
1 cubit*	= 0.555 m

Unit	Cubit*
1 finger	= $\frac{1}{24}$
1 palm	= $\frac{1}{6}$
1 zereth	= $\frac{1}{2}$

Mass (Sacred system)

1 mina	= 850 g
Unit	Mina
1 obol	}
1 gerah	
1 rabah	= $\frac{1}{16}$
1 bekah	= $\frac{1}{24}$
1 shekel	= $\frac{1}{60}$
1 talent†	= 50

Mass (Talmudist or Rabbinical system)

1 mina	= 354.2 g
Unit	Mina
1 pondiuscule	= $\frac{1}{1200}$
1 mehah	}
1 gerah	
1 obol	= $\frac{1}{60}$
1 zuzah	}
1 drachma	
1 shekel	= $\frac{1}{24}$
1 tetradrachma	= $\frac{1}{6}$
1 talent	= 60

Capacity, dry

(Measured by weight)

1 ephah	(old) = 29.376 kg
	(new) = 21.420 kg

Unit	Ephah
1 log	= $\frac{1}{12}$
1 cab	= $\frac{1}{8}$
1 gomor	= 0.1
1 sath	}
1 modius	
1 cor	= 10

Capacity, liquid

(Measured by weight)

1 bath (old)	= 29.376 kg
1 bath (new)	= 21.420 kg

Unit	Bath
1 log	= $\frac{1}{12}$
1 hin	= $\frac{1}{6}$
1 cor	= 10

* Talmudist.

† Of Moses.

Hindu System.*Length*

1 hasta	= 0.457 m
Unit	Hasta

1 angula (finger)	= $\frac{1}{4}$
1 vitasti (span)	= $\frac{1}{2}$
1 cubit	= 1
1 dhanush	}
1 orgyla	
1 crosa	= 8000
1 gavyuti	= 16 000
1 yodjana	= 32 000

Mass

1 retti	}
1 ratika	
1 pala	= 47 g

Unit	Retti
1 yava	= 0.1
1 masha	= 2, 5, 6, or 8
1 tank-sala	= 24
1 kona	= 48
1 tola	= 80
1 karsha	= 96

1 dharana	= { 32 (silver) 3200 (gold)
1 pala	= 320
Unit	Pala
1 tuba	= 100
1 hara	= 200
1 bara	= 2000
1 achita	= 20 000

Capacity

(Measured by weight)

1 drona	= 13.2 kg
Unit	Drona
1 pala	}
1 musti	
1 cudava	= $\frac{1}{32}$
1 prastha	= $\frac{1}{16}$
1 adhaka	= $\frac{1}{4}$
1 cumbha (small)	= 2
1 shari	= 16
1 cumbha	= 20
1 baha	= 200

Persian System v. Assyrio-Chaldean-Persian.**Roman System.***Length*

1 pes (common or Drusian) (foot)	= 0.3196 m
1 legal pes (1st)	= 0.2962 m
1 legal pes (2nd)	= 0.2967 m
Unit	Pes
1 digitus (finger)	= $\frac{1}{16}$
1 uncia (inch)	= $\frac{1}{12}$
1 cubitus (cubit)	= $1\frac{1}{2}$
1 passus (pace)	= 5

1 decempeda (perch)	= 10
1 actus (chain)	= 120
1 millarium (mile)	= 5000

Mass

1 podium	= 326 g
Unit	Podium
1 scrupulus	= $\frac{1}{288}$
1 denier*	= $\frac{1}{8}$
1 denier†	= $\frac{1}{16}$
1 denarius	= $\frac{1}{84}$
1 solidus	}
1 sextula	
1 miliariesium	= $\frac{1}{10}$
1 sicilium	= $\frac{1}{8}$
1 duella	= $\frac{1}{36}$
1 semuncia	= $\frac{1}{24}$
1 ounce	= $\frac{1}{12}$
1 mina	= $1\frac{1}{2}$
1 centum-podium	= 100

Area

1 common pes ²	= 0.102 14 m ²
1 legal pes ² (1st)	= 0.087 73 m ²
1 legal pes ² (2nd)	= 0.088 03 m ²

Unit	Pes ²
1 decempeda ²	= 100
1 actus (small)	= 400
1 clima	= 3600
1 versum	= 10 000
1 actus	= 14 400
1 jugerum	= 28 800
1 heredium	= 57 600
1 centuria	= 5 760 000
1 saltus	= 23 040 000

Capacity, dry

1 sextarius	= 544 g
Unit	Sextarius
1 modius	= 16
1 quadrantal	= 48
1 pes ³ † (of water)	= 48

Capacity, liquid

(Measured by weight)

1 sextarius	}
1 sextus	
1 cyathus	= $\frac{1}{12}$
1 acetabulum	= $\frac{1}{6}$
1 quartus	= $\frac{1}{4}$
1 hemina	= $\frac{1}{2}$
1 congius	= 6
1 urna	= 24
1 amphora	= 48
1 culeus	}
1 dolium	
	= 960

* Silver.

† Neronian.

‡ Legal pes (2).

SYMBOLS, BASIC CONSTANTS, CONVERSION DATA, DIMENSIONS, DEFINITIONS

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BASES OF DATA CONTAINED IN I. C. T.

When many experts are cooperating in the assembling of data, it is essential that the same values for the fundamental constants and for the necessary conversion factors shall be employed by all. Consequently, at the very beginning of the work, the Editors compiled a set of accepted, or I. C. T., values for such constants and factors; and the Experts were instructed to base all their data upon these values. In the few cases in which it was not feasible to follow these instructions, the data were to be accompanied by a statement of the actual basis upon which they rest.

In compiling this list, and in choosing the accepted values of such of the quantities as were independently chosen, the Editors secured and utilized the advice of the United States Bureau of Standards, the National Physical Laboratory of Great Britain, and the Société Française de Physique. Acknowledgments are also due to Dr. F. E. Fowle, of the Smithsonian Institution, for his valued assistance in preparing the initial table of fundamental constants, and to Professors T. W. Richards and G. P. Baxter for their recommendations concerning the table of atomic weights.

The list so prepared comprised (1) a table of atomic weights (p. 43), (2) a set of nine basic constants (p. 17) (the estimated uncertainties were added at a later date), (3) twenty-one derived constants (computed directly from the nine basic constants), five conventional constants, and two experimental constants (p. 18) and (4) certain conversion factors selected from Tables 1 to 79 (p. 20-32). Although the accepted values were close approximations to the best values at that time available, it was not claimed that they were such best values.

SYMBOLS AND ABBREVIATIONS

Except as the contrary is definitely stated, the following symbols and abbreviations will always be used in the sense here indicated. Other symbols will be defined in the sections in which they are used. For those quantities which are included in the list of symbols approved by the International Association of Chemical Societies (4, 119: 502; 21), the symbols so approved have, in general, been used; in some cases, this has necessitated the use of the same symbol to represent two distinct quantities; the context will serve to indicate which interpretation is correct. For explanations of the several technical terms, consult Selected Technical Terms, p. 34.

Å	Ångstrom unit	ap.	Apothecaries
A.	Acre	Av.	Average
A _n	Normal atmosphere	av.	Avoirdupois
A ₄₅	Atmosphere, 45° latitude	a	Van der Waal's pressure constant. Capillary constant.
A	Atomic weight. Maximum work of a thermodynamic system		
a	Are	BTU	British Thermal Unit
(a)	Based on Int. ohm and Int. ampere as defined by silver voltameter. (See Int. elec. units, p. 27)	bbl.	Barrel
		bd.	Board
		bu.	Bushel
abs.	Absolute	b	Van der Waal's volume constant

C	Centigrade	fir.	Firkin
CTU	Centigrade thermal unit	fl.	Fluid
C	Concentration. Molecular heat	fps	Foot-pound-second system of units
C ₁ , C ₂	Radiation constants of black body. (See definition of black body.)	fpse	Fps electrostatic system
		fpem	Fps electromagnetic system
C _i	Intensity coefficient. (See definition of black body.)	ft. ²	Square foot
C _p , C _v	Molecular heat at constant pressure, at constant volume	ft. ³	Cubic foot
		fur.	Furlong
c	Velocity of light in vacuo	G	Gravitation constant
c	Carat. Centi-	g	Gram
ca	Candle	gal.	Gallon
ca.	circa = about, approximately	gi.	Gill
		gr.	Grain
cal	Calorie (gram)	g	Acceleration due to gravity
cd.	Cord	g _s	Standard gravity
cf.	Confer = compare	HP	Horse-power
cgs	Centimeter-gram-second system of units	H	Atomic weight of hydrogen
cgs _{es}	Cgs electrostatic system	h	Planck's constant of action
cgs _{em}	Cgs electromagnetic system	h	Hecto-
ch.	Chain	ha	Hectare
cm	Centimeter	hhd.	Hogshead
cm ²	Square centimeter	h.p.	Horse-power
cm ³	Cubic centimeter	hr	Hour
c.p.	Candle power	h	Height
cu.	Cubic	Int.	International
cu. ft.	Cubic foot	I. C. T.	International Critical Tables
cwt.	Hundredweight	I	Electric current
c	Specific heat = heat capacity of the substance	ibid.	Ibidem = in the same place
C _p , C _v	Specific heat at constant pressure, at constant volume	i.e.	Id est = that is
		in.	Inch
		in. ³	Cubic inch
D	Density	J	Radiance
d	Derivative. Deci-	J _λ	Intensity of monochromatic radiance of wave-length λ
da	Day	J _m	Value of J _λ for λ = λ _m
deg	Thermometric degree, absolute C unless contrary is indicated	K	Karat. Kelvin, or absolute C, scale of temperature
dk	Deka-	K	Constant of chemical equilibrium
dm ³	Cubic decimeter	k	Kilo-
dr.	Dram	kg	Kilogram
dwt.	Pennyweight	km	Kilometer
d	Density. Diameter	km ²	Square kilometer
d _c	Critical density	k	Velocity coefficient of chemical reaction
d _{t₁} ²	Specific gravity at temperature t ₁ , with reference to water at temperature t ₁	k ₀	Boltzmann's gas constant
E	Electromotive force	L	Latent heat per mole
E ₀	Mean translational energy of molecule of ideal gas at 0°C	l	Liter
e	Electronic charge	l.	Long
e	Base of natural system of logarithms = 2.71828+	lat.	Latitude
e.g.	Exempli gratia = for example	lb.	Pound
em	Cgs unit of quantity of electricity	li.	Link
emf	Electromotive force	liq.	Liquid
equiv	Electrochemical equivalent	long.	Longitude
es	Cgs unit of quantity of electricity	l	Length. Latent heat per gram
etc.	Et cetera = and so forth	M	Molecular weight
et seq.	Et sequentes = and the following	M [α]	Molecular rotatory power
co	Ratio of E ₀ to T ₀	M [ω]	Molecular magnetic rotatory power
F	Faraday	m ₀	Mass of electron at low velocity
F	Fahrenheit	m	Meter. Milli-
fath.	Fathom	m ²	Square meter
		max.	Maximum
		mg	Milligram
		mi.	Mile
		min	Minute

min.	Minim, Minimum	T_0	Ice point, absolute C
ml	Milliliter	T	Temperature on absolute C scale
mmf	Magnetomotive force	T_c	Critical temperature, absolute C
m μ	Millimicron. Millimicro-	t	Metric ton
m	Mass	$t.$	Troy
m_H	Mass of a hydrogen atom	tn.	Ton
N	Numeric	t	Time. Temperature C (above ice point)
N_0	Avogadro's number	t_c	Critical temperature C (above ice point)
N_∞	Rydberg's universal series constant	U. S.	United States of America
n	Refractive index	V	Volume
n_+, n_-	Transport number for anion, kation	v_0	Volume per gram-mole of ideal gas at 0°C and A_n
n_0	Loschmidt's number	$v.$	<i>Vide</i> = see
O	Atomic weight of oxygen	(v)	Based on Int. ohm and Int. volt as defined by standard cell. (See Int. elec. units, p. 27.)
os.	Ounce	v	Volume
P	Pressure	v_c, v_r	Critical volume, reduced volume
pk.	Peck	W	Electrical resistance
pt.	Pint	wt.	Weight
p	Pressure	w	Wien's displacement constant
p_c, p_r	Critical pressure, reduced pressure	Y	Yard
Q	Quantity	yr	Year
q	Quintal	Z	Atomic number
qt.	Quart	α	Degree of dissociation.
q.v.	<i>Quod vide</i> = which see		Angle of optical rotation
R	Réaumur	$[\alpha]$	Specific rotatory power
R	Gas constant per mole of ideal gas. Electrical resistance.	β	Specific heat constant
rd.	Rod	γ	Surface tension. Ratio of c_p/c_v . Gamma (magnetic unit)
r	Radius	Δ	Diffusion coefficient
r_G	Specific refractivity (Gladstone and Dale)	ϵ	Dielectric constant. Electrode potential
r_L	Specific refraction (Lorentz and Lorenz)	ϵ_+, ϵ_-	Electrode potential above that of normal hydrogen, of normal calomel, electrode
r_1	Radius of first Bohr ring, hydrogen	η	Viscosity
S.E.	Siemens unit	θ	Angle (plane). Temperature C above ice point
S	Entropy		
s	Stere		
sc.	Scruple		
sec	Second (mean solar unless contrary is stated)		
sh.	Short		
sq.	Square		
sq. ft.	Square foot		

κ	Susceptibility (magnetic).	\mathfrak{M}	Minim
	Electrical (volume) conductivity	\mathfrak{S}	Apothecaries' ounce
Λ	Equivalent conductivity (electrical)	\mathfrak{D}	Apothecaries' dram
λ	Wave-length. λ_{5890} = spectral line of wave-length = 5890Å	$^\circ$	Apothecaries' scruple
λ_m	Wave-length of maximum monochromatic radiance of black-body at stated temperature	$'$	Degree (arc or temperature)
μ	Permeability (magnetic).	$''$	Minute of arc (sexagesimal)
$\mu\mu$	Micromicron. Micromicro-	$\%$	Second of arc (sexagesimal)
ν	Frequency	$\%$	Percent = per hundred
ν_∞	Rydberg's fundamental frequency	$\%$	Per thousand = 0.1 %
τ	Ratio of circumference of a circle to its diameter	[]	Dimensional expressions are enclosed in []. In text, [] is used to inclose a second reading. (E.g., Length [diameter] of the bar is 10 cm [1 cm] = length of bar is 10 cm, diameter of bar is 1 cm)
σ	Stefan's constant (radiation)	$<$	$A < B$ [$A > B$] denotes that A is less than [greater than] B
ϕ	Fluidity. Angle	\nless	Negative of $<$; $A \nless B$ denotes that A is not less than B
ψ	Luminous flux	\leq	Combination of $<$ and $=$; $A \leq B$ denotes that A is equal to or less than, B
Ω	Ohm	\neq	Is not equal to
$[\Omega]$	Relative molecular magnetic rotatory power with reference to water	\equiv	Identically equal to; used in defining symbols, etc.
ω	Solid angle	\approx	Approximately (or essentially) equal to
$[\omega]$	Specific magnetic rotatory power	∞	Infinity

FUNDAMENTAL CONSTANTS

By an *accepted*, *conventional*, or *defined* value, is meant one which is to be regarded as exactly correct for purposes of computation.¹ Thus, errors from computational approximations are avoided and do not enter into consideration in any future revision of the computed result for a discovered difference between the true and the accepted value. When the computation involves several accepted values, it is especially important that each shall be regarded as exactly correct, for only then can the result be independently revised (without complete recalculation) for changes in the values of each. For this reason the logarithms of the several accepted values are given to the full precision of Vega's seven-place table. The degree of uncertainty in the value accepted is indicated by the number of significant figures retained in the value itself, not by the logarithm.

value, and to give as its logarithm an abbreviated value, is to introduce an ambiguity of a magnitude determined by the degree of abbreviation of the logarithm. But the sole object in adopting accepted or conventional values is to avoid ambiguity.

ACCEPTED BASIC CONSTANTS Units: cgs, °C, liter, A_n , absolute electric

Quantity	Value	Uncertainty	Log ₁₀ (value)
c Velocity of light.....	2.9986×10^{10} cm sec ⁻¹	0.0003	10.476 9185
G Gravitation constant.....	6.66×10^{-8} cm ³ g ⁻¹ sec ⁻²	0.01	8.823 4742
e Electronic charge.....	4.774×10^{-10} es	0.005	10.678 8824
e Electronic charge.....	$*1.592 \times 10^{-20}$ em		20.201 9639
e/ m_0 Electronic ratio.....	5.305×10^{17} es g ⁻¹	0.010	17.724 6854
e/ m_0 Electronic ratio.....	$*1.769 \times 10^7$ emg ⁻¹		7.247 7669
F Faraday.....	9.6500×10^4 coulombs	0.0010	4.984 5273
F Faraday.....	$*2.893 65 \times 10^{14}$ es		14.461 4458
v_0 Volume 1 mole at 0°C, A_n	$\dagger 22.4115 \times 10^3$ cm ³ mole ⁻¹	0.002	4.350 4709
h Planck's constant.....	6.554×10^{-27} erg sec	0.001	27.816 5064
T_0 Ice point, absolute.....	273.1 deg C	+0.15 to -0.05	2.436 3217
O Atomic weight of oxygen.....	16.000 (by definition)	(definition)	1.204 1200

* This value is derived from the preceding one, which is the value actually accepted.

† Derived from volume at 0°C, $A_{48} = 22.412$ liters/g-mole on assumption $\log_{10} (A_n/A_{48}) = 0.000 0214$, liter = 1000.027 cm³.

ACCEPTED CONSTANTS:—CONVENTIONAL AND NON-BASIC Units: cgs, °C, liter, A_n absolute electric, international angstrom

Quantity		Value	Log ₁₀ (value)
<i>A. Derived Constants</i>			
R	Gas constant.....	8.315×10^7 erg deg ⁻¹ mole ⁻¹	7.919 8658
R	Gas constant.....	0.082 06 liter atm deg ⁻¹ mole ⁻¹	2.914 1375
R	Gas constant.....	1.9869 cal ₁₈ deg ⁻¹ mole ⁻¹	0.298 1703
N_0	Avogadro's number.....	6.061×10^{23} mole ⁻¹	23.782 5634
n_0	Loschmidt's number.....	2.705×10^{19} cm ⁻³ (at 0°C, A_n)	19.432 0925
k_0	Molecular gas constant.....	1.372×10^{-16} erg deg ⁻¹	16.137 3024
E_0	Translational energy of molecules, 0°C.....	5.620×10^{-14} erg	14.749 7154
e_0	Ratio of E_0 to T_0	2.058×10^{-16} erg deg ⁻¹	16.313 3937
m_H	Mass of hydrogen atom.....	1.663×10^{-24} g	24.220 7679
m_0	Electronic mass.....	8.999×10^{-28} g	28.954 1970
r_1	Radius 1st Bohr ring of hydrogen.....	0.5305×10^{-8} cm	9.724 6912
h/e	Photo-electric constant.....	1.373×10^{-17} erg sec es ⁻¹	17.137 6240
h/e	Photo-electric constant.....	*4.117 $\times 10^{-15}$ volt sec	15.614 5425
hc/e	Photo-electric constant.....	4.117×10^{-7} erg cm es ⁻¹	7.614 5425
hc/e	Photo-electric constant.....	1.2344 $\times 10^4$ volt Å	4.091 4610
β	Specific heat constant.....	4.778×10^{-11} sec deg	11.679 2040
σ	Stefan's constant.....	5.709×10^{-5} erg cm ⁻² sec ⁻¹ deg ⁻⁴	5.756 5416
C_1	Radiation constant, first.....	3.703×10^{-5} erg cm ² sec ⁻¹	5.568 5233
C_2	Radiation constant, second.....	1.433 cm deg	0.156 1225
w	Wien's displacement constant.....	0.2885 cm deg	1.460 1933
C_i	Intensity coefficient.....	1.301×10^{-4} erg cm ⁻³ sec ⁻¹ deg ⁻⁵	4.114 2762
ν_∞	Rydberg frequency.....	3.2775×10^{15} sec ⁻¹	15.515 5372
N_∞	Rydberg wave number.....	1.0930×10^6 cm ⁻¹	5.038 6187
<i>B. Conventional Constants</i>			
A_n	Normal atmosphere.....	$1.0132\ 50 \times 10^6$ dyne cm ⁻²	6.005 7166
A_{45}	Atmosphere, latitude 45°.....	$1.0132\ 00 \times 10^6$ dyne cm ⁻²	6.005 6952
Å	Wave-length of red Cd line is.....	6438.4696 Å	4.808 7827
g_s	Standard gravity.....	980.665 cm sec ⁻²	2.991 5207
	Aberration constant.....	20.47"	1.311 1178
<i>C. Experimental Constants</i>			
	Grating space in calcite.....	3.028 Å	0.481 1559
H	Atomic weight of hydrogen.....	1.0077	0.003 3313
†Liter.	.....	1000.027 cm ³	3.000 0117
†Gram calorie (20°C).....		4.181 joule	0.621 2802
†Gram calorie (15°C).....		4.185 joule	0.621 6955
†Gram calorie (mean).....		4.186 joule	0.621 7992
†British Thermal Unit (39°F).....		1060.4 joule	3.025 4697
†British Thermal Unit (mean).....		1054.8 joule	3.023 1701
†British Thermal Unit (60°F).....		1054.6 joule	3.023 0878
†International ohm.....		1.000 52 ohm	0.000 2259
†International ampere (v)§.....		0.999 90 ampere	0.999 9566
†International ampere (a)§.....		0.999 93 ampere	0.999 9696

* This value is derived from the preceding one, which is the value actually accepted.

† In the original list, this quantity was included solely in the list of conversion factors; its value, however, is an independently selected, accepted constant, and, consequently, is treated as exact in all computations.

§ (v) = Based on Int. ohm and Weston normal cell = 1.018300 Int. volts at 20°C; (a) = based on deposit of 1.11800 mg of silver per Int. ampere second.

CONVERSION FACTORS AND DIMENSIONAL FORMULAE

N. ERNEST DORSEY

In the following tables are given the factors by which values expressed in other units must be multiplied in order to obtain their equivalents in units of the centimeter-gram-second (cgs) system. To convert in the reverse direction, divide by the factor given. The dimensional formula in the cgs, or any similarly constructed, system is given in the title of each table.

Conversion Factors.—With few exceptions,¹ the values given are based exclusively upon legal definitions, conventional con-

¹ The exceptions are (1) astronomical unit of distance, (2) parsec, (3) sidereal second, (4) certain units of luminous intensity, (5) international electrical units prior to 1911, and (6) the data for hydrometers.

stants, and the I. C. T. accepted values (p. 16). Consequently, they are computable to as extreme a precision as may be desired. They have been computed by means of Vega's seven-place logarithms, and it is hoped that their logarithms as given are correct to a unit in the last digit. Obviously, those factors which involve the accepted value of an experimentally determined constant will be in error by an amount determined by the error in the accepted value; but quantities converted by means of the logarithms given will retain their same relative precision, however great this may be, within the limit set by the seven-place table, and may at any time be as exactly corrected for a revision of the accepted value. This would not be true if an abbreviated logarithm were used, unless the exact value of the abbreviated logarithm itself were given. The latter would be equivalent merely to the adoption of another accepted value for the experimental constant involved;

and the new value so fixed would, in general, be expressible only by an indefinite number of digits. The former procedure is to be preferred.

Frequently, the same factor applies to more than one type of physical quantity; if the units of the several types have distinctive names, separate tables are given, otherwise, not. In general, the tables are arranged in the order of increasing complexity of the dimensional formulae. Some quantities for which conversion factors are seldom required, and a few dimensionless quantities have been grouped together in Table 78. The dimensional formulae of the more important electric and magnetic units, and the numerical relations connecting these units in the three systems most frequently used, are assembled in Table 77. To find the conversion factor for a given quantity, consult the index below.

Dimensions.—Two types of dimensional equations need to be considered, viz.: (1) Those in which the dimensions are expressed in terms of the quantities directly involved in the phenomenon under consideration, and (2) those in which the dimensions are expressed in terms of certain fundamental units.

As an illustration of the first we may consider the force of repulsion between two point charges (e, e') of electricity situated at a distance, r , apart in a medium of dielectric constant ϵ . If this force is denoted by f , then $f = ee'/\epsilon r^2$, and we may write $[e^2] = [f r^2]$, $[\epsilon] = [e^2 f^{-1} l^{-2}]$, etc., where $[]$ denotes that we are concerned with dimensions only; $[l]$ denotes the dimension of length, $[f]$ that of force, etc. These dimensional equations are true whatever be the system of units employed. As they involve quantities, such as force, which can be expressed in terms of other units that are usually considered more fundamental, such dimensional equations will be referred to as "unreduced," in order to distinguish them from those of the second class in which the dimensions are expressed solely in terms of a small number of fundamental units.

It is evident that the dimensions of a quantity in terms of fundamental units can be assigned only in relation to a specific system of units and to a specific method of derivation. For example, (1) if the unit of volume is defined as the volume occupied by a unit mass of water when at its greatest density under a pressure of one atmosphere, then the volume so defined will be independent of the units of length and time, and will vary directly as the unit of mass: we will have $[v] = [m]$. (2) If the unit of

volume is defined as the volume occupied by a mass of water (when at its greatest density, etc.) which is equal to the mass of a specified block of platinum, then the volume so defined will not change as we change our units of length, of mass, and of time: that is $[v] = [v]$. In this case $[v]$ is an independent unit and must be so regarded in all dimensional equations. (3) If the unit of volume is defined as the volume of a cube of which the edge is equal to the unit of length then $[v] = [l^3]$. A unit may be defined in any desired unambiguous manner and, in general, the dimensions of the unit will vary from definition to definition.

Dimensional equations of the second type stand in marked contrast to those of the former, in being far less general and in implying the acceptance of a very exactly defined system of units. This, however, is the type of equation which is commonly in mind when dimensional equations are mentioned, and is probably the one which is the more generally useful; the unreduced dimensional expressions (the first type), however, are often simpler, convey more detailed information, and in many cases are to be preferred. For these reasons, unreduced dimensional expressions are to be found in explanations of technical terms (p. 34); they are followed by others, the final one in each case being the fully reduced dimensions on the centimeter, gram, second, degree centigrade absolute, electrostatic system. Wherever necessary, this system of units will be denoted by the symbol *cgse* in order to distinguish it from the corresponding electromagnetic system, which will be denoted by *cgs_m*. In the conversion tables, dimensional formulae only of the *cgse* and of the *cgs_m* systems are given. In the *cgse* system, the fundamental units and their symbols are those of length $[l]$ the centimeter, of mass $[m]$ the gram, of time $[t]$ the mean solar second, of temperature $[T]$ the absolute centigrade degree, and of dielectric constant $[\epsilon]$, that of a vacuum. The fundamental units in the *cgs_m* system differ from those in the *cgse* system only by the replacement of dielectric constant by magnetic permeability $[\mu]$, the unit being the permeability of a vacuum.

It should be realized that dimensional expressions give no positive information regarding the ultimate nature of the quantity to which they refer; e.g., energy and torque have the same dimensions, but differ vastly in their nature.

Symbols.—(U. S.) before a logarithm denotes that it is based upon the U. S. yard; for explanation of other symbols, see Symbols and Abbreviations, p. 16.

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CONVERSION FACTORS

1. Length [*l*] (see also p. 1)

Unit		Value	Log ₁₀ (value)
1 angström unit	=	1.0000 × 10 ⁻⁸ cm	8.000 0000
1 micron	=	1.0000 × 10 ⁻⁴ cm	4.000 0000
1 mil	=	2.5400 × 10 ⁻³ cm	3.404 8346
1 inch	=	2.5400 cm	(U. S.) 0.404 8346
1 foot	=	30.480 cm	(U. S.) 1.484 0158
1 yard (U. S.)	=	91.44018 cm	1.961 1371
1 yard (British)	=	91.43992 cm	1.961 1350
1 mile, statute	=	1.6093 km	(U. S.) 0.206 6497
1 light year	=	9.4627 × 10 ¹² km	12.976 0131
1 astronomical unit	=	1.495 × 10 ⁸ km	8.174 6712
1 parsec	=	3.084 × 10 ¹³ km	13.489 09

2. Length⁻¹; Absorptivity; Coefficient of Absorption* [*l*⁻¹]

1 angström ⁻¹	=	1.0000 × 10 ⁸ cm ⁻¹	8.000 0000
1 micron ⁻¹	=	1.0000 × 10 ⁴ cm ⁻¹	4.000 0000
1 mil ⁻¹	=	393.70 cm ⁻¹	2.595 1654
1 inch ⁻¹	=	0.39370 cm ⁻¹	(U. S.) 1.595 1654
1 foot ⁻¹	=	3.2808 × 10 ⁻³ cm ⁻¹	(U. S.) 2.515 9842
1 mile ⁻¹	=	0.62137 km ⁻¹	1.793 3503

* Coefficient of transmission (*τ*) is so defined that $-\log_e \tau$ = coefficient of absorption.

3. Mass [*m*]; Weight (see also p. 1)

1 grain	=	64.799 mg	1.811 5677
1 carat (metric)	=	200.000 mg	2.301 0300
1 ounce (avoirdupois)	=	28.350 g	1.452 5458
1 ounce (apothecary) or (troy)	=	31.103 g	1.492 8090
1 pound (avoirdupois)	=	453.59243 g	2.656 6658
1 pound (apothecary) or (troy)	=	373.2417 g	2.571 9902
1 ton, short (2000 pounds)	=	907.185 kg	2.957 6958
1 ton, long (2240 pounds)	=	1016.047 kg	3.006 9138
1 slug (<i>g</i>)	=	14.594 kg	1.164 1707
1 gram mole	=	M. W.† g	
1 molecule/M. W.†	=	1.6498 × 10 ⁻²⁴ g	24.217 4366
1 assay ton	=	29.1667 g	1.464 8868

† M. W. denotes the molecular weight of the substance.

4. Mass⁻¹ [*m*⁻¹]

1 grain ⁻¹	=	1.5432 × 10 ⁻² mg ⁻¹	2.188 4323
1 ounce ⁻¹ (avoirdupois)	=	3.5274 × 10 ⁻² g ⁻¹	2.547 4542
1 ounce ⁻¹ (troy)	=	3.2151 × 10 ⁻² g ⁻¹	2.507 1910
1 pound ⁻¹ (avoirdupois)	=	2.2046 × 10 ⁻³ g ⁻¹	3.343 3342
1 ton ⁻¹ (2000 pounds)	=	11.0231 × 10 ⁻⁴ kg ⁻¹	3.042 3042
1 ton ⁻¹ (2240 pounds)	=	9.8421 × 10 ⁻⁴ kg ⁻¹	4.993 0862
1 (gram mole) ⁻¹	=	†(M. W.) ⁻¹ g ⁻¹	

† M. W. denotes the molecular weight of the substance.

5. Time [*t*]

1 second, mean solar	=	1.00273791 sidereal sec	0.001 1874
1 second, sidereal	=	0.997270 sec (mean solar)	1.998 8126
1 hour (tropical, mean solar)	=	3.6000 × 10 ³ sec (mean solar)	3.556 3025
1 day (tropical, mean solar)	=	8.6400 × 10 ⁴ sec (mean solar)	4.936 5137
1 day (sidereal)	=	8.6164 × 10 ⁴ sec (mean solar)	4.935 3263
1 year (tropical, mean solar)	=	31.5569 × 10 ⁶ sec (mean solar)	7.499 0946
1 year (tropical, mean solar)	=	365.2422 day (mean solar)	2.562 5809

CONVERSION FACTORS.—Continued

6. Time⁻¹; Frequency; "Velocity" of a Process [*t*⁻¹]

1 second ⁻¹ (sidereal)	=	1.002738 sec ⁻¹ (mean solar)	0.001 1874
1 minute ⁻¹ (mean solar)	=	1.66667 × 10 ⁻² sec ⁻¹ (mean solar)	2.221 8487
1 hour ⁻¹ (mean solar)	=	2.77778 × 10 ⁻⁴ sec ⁻¹ (mean solar)	4.443 6975
1 day ⁻¹ (mean solar)	=	1.15741 × 10 ⁻⁵ sec ⁻¹ (mean solar)	5.063 4863
1 year ⁻¹ (mean solar)	=	3.16888 × 10 ⁻⁸ sec ⁻¹ (mean solar)	8.500 9054
1 year ⁻¹ (mean solar)	=	2.73791 × 10 ⁻³ day ⁻¹ (mean solar)	3.437 4191
1 electron-volt, quantum ⁻¹	=	2.4292 × 10 ¹⁴ sec ⁻¹ (mean solar)	14.385 4575
1 joule per mole, <i>N</i> ₀ ⁻¹ quantum ⁻¹	=	2.5173 × 10 ⁹ sec ⁻¹ (mean solar)	9.400 9301
1 velocity of light, (angström unit) ⁻¹	=	2.9986 × 10 ¹⁸ sec ⁻¹ (mean solar)	18.476 9185
1 velocity of light, millimicron ⁻¹	=	2.9986 × 10 ¹⁷ sec ⁻¹ (mean solar)	17.476 9185
1 velocity of light, micron ⁻¹	=	2.9986 × 10 ¹⁴ sec ⁻¹ (mean solar)	14.476 9185
1 velocity of light, millimeter ⁻¹	=	2.9986 × 10 ¹¹ sec ⁻¹ (mean solar)	11.476 9185
1 velocity of light, meter ⁻¹	=	2.9986 × 10 ⁸ sec ⁻¹ (mean solar)	8.476 9185

7. Angle [θ]

1 radian	=	57.29578 degree	1.758 1226
1 circumference	=	6.28319 radian	0.798 1799
1 quadrant	=	1.57080 radian	0.196 1199
1 degree	=	1.74533 × 10 ⁻² radian	2.241 8774
1 minute	=	2.90888 × 10 ⁻⁴ radian	4.463 7261
1 second	=	4.84814 × 10 ⁻⁶ radian	6.685 5749

8. Angle⁻¹ [θ⁻¹]

1 circumference ⁻¹	=	0.159155 radian ⁻¹	1.201 8201
1 degree ⁻¹	=	57.29578 radian ⁻¹	1.758 1226
1 minute ⁻¹	=	3.43775 × 10 ³ radian ⁻¹	3.536 2739
1 second ⁻¹	=	2.06265 × 10 ⁵ radian ⁻¹	5.314 4251

9. Solid Angle [ω]

Entire space	=	12.5664 steradian	1.099 2099
1 hemisphere	=	6.2832 steradian	0.798 1799
1 square degree	=	3.0462 × 10 ⁻⁴ steradian	4.483 7548

10. Solid Angle⁻¹ [ω⁻¹]

Entire space ⁻¹	=	7.9577 × 10 ⁻² steradian ⁻¹	2.900 7901
1 hemisphere ⁻¹	=	1.5916 × 10 ⁻¹ steradian ⁻¹	1.201 8201
1 square degree ⁻¹	=	3.2828 × 10 ³ steradian ⁻¹	3.516 2452

11. Temperature [*T*] (See also Thermometry, p. 52)

Fahrenheit	.....	x° F	= (5/9)(x - 32)°C
Réaumur	.....	x° R	= (4/5)x°C
Absolute (Centigrade)	.....	x° K	= (x - T ₀)°C
Absolute (Fahrenheit)	.....	x° Rankine	= (5/9)(x - 491.58)°C

12. Degree⁻¹ (Thermometric); Expansivity; Curie's Constant (magnetic) [*T*⁻¹]

1 per degree F	=	1.8000 per degree C	0.255 2725
1 per degree R	=	0.8000 per degree C	1.903 0900
1 per degree K	=	1.000 per degree C	0.000 0000

13. Luminous Flux [ψ]

By definition, the total luminous flux emitted by a point source of one spherical candle power is 4π lumen.

14. Dielectric Constant; Electrical Inductivity [ε]; [μ⁻¹l⁻²t²]

Specific inductive capacity is of zero dimensions. It is numerically equal to the dielectric constant expressed in cgse or in fpse units.

1 cgsm unit	=	8.9916 × 10 ²⁰ cgse unit	20.953 8370
1 fpse unit	=	1.0000 cgse unit	0.000 0000
1 fpsm unit	=	1.0764 × 10 ⁻³ cgsm unit	3.031 9684
1 fpm unit	=	9.6784 × 10 ¹⁷ cgse unit	17.985 8054

15. Magnetic Permeability; Susceptibility [ε⁻¹l⁻²t²]; [μ]

1 cgse unit	=	8.9916 × 10 ²⁰ cgsm unit	20.953 8370
1 fpsm unit	=	1.0000 cgsm unit	0.000 0000
1 fpse unit	=	1.0764 × 10 ⁻³ cgse unit	3.031 9684
1 fpm unit	=	9.6784 × 10 ¹⁷ cgsm unit	17.985 8054

CONVERSION FACTORS.—Continued

16. Area [l^2]

1 circular millimeter	=	$7.8540 \times 10^{-3} \text{ cm}^2$	3.895 0899
1 circular mil	=	$5.0671 \times 10^{-6} \text{ cm}^2$	(U. S.) 6.704 7591
1 square inch	=	6.4516 cm^2	(U. S.) 0.809 6692
1 square foot	=	$9.2903 \times 10^2 \text{ cm}^2$	(U. S.) 2.968 0316
1 square yard	=	$8.3613 \times 10^3 \text{ cm}^2$	(U. S.) 3.922 2742
1 square mile	=	2.5900 km^2	(U. S.) 0.413 2995
1 are	=	$1.0000 \times 10^2 \text{ m}^2$	2.000 0000
1 hectare	=	$1.0000 \times 10^4 \text{ m}^2$	4.000 0000
1 acre	=	$4.0469 \times 10^3 \text{ m}^2$	3.607 1196

17. Area⁻¹ [l^{-2}]

1 (circular millimeter) ⁻¹	=	127.324 cm^{-2}	2.104 9101
1 millimeter ⁻²	=	100.0000 cm^{-2}	2.000 0000
1 meter ⁻²	=	0.0001 cm^{-2}	4.000 0000
1 (circular mil) ⁻¹	=	$1.9735 \times 10^5 \text{ cm}^{-2}$	(U. S.) 5.295 2409
1 inch ⁻²	=	0.15500 cm^{-2}	(U. S.) 1.190 3308
1 foot ⁻²	=	$1.0764 \times 10^{-3} \text{ cm}^{-2}$	(U. S.) 3.031 9684
1 yard ⁻²	=	$1.19599 \times 10^{-4} \text{ cm}^{-2}$	(U. S.) 4.077 7258
1 mile ⁻²	=	0.38610 km^{-2}	(U. S.) 1.586 7005

18. Volume [l^3] or [v]

1 liter	=	1000.027 cm^3	3.000 0117
1 cubic inch	=	16.387 cm^3	(U. S.) 1.214 5038
1 cubic foot	=	$2.8317 \times 10^4 \text{ cm}^3$	(U. S.) 4.452 0474
1 cubic yard	=	$7.6456 \times 10^5 \text{ cm}^3$	(U. S.) 5.883 4112
1 gallon (U. S.)	=	$3.7854 \times 10^3 \text{ cm}^3$	3.578 1157
1 gallon (British)	=	$4.5461 \times 10^3 \text{ cm}^3$	3.657 6376
1 bushel (U. S.)	=	$3.5239 \times 10^4 \text{ cm}^3$	4.547 0271
1 bushel (British)	=	$3.6369 \times 10^4 \text{ cm}^3$	4.560 7276
1 quart, dry (U. S.)	=	1101.23 cm^3	3.041 8771
1 quart, liquid (U. S.)	=	946.358 cm^3	2.976 0557
1 quart (British)	=	1136.521 cm^3	3.055 5776
1 fluid ounce (U. S.)	=	29.5737 cm^3	1.470 9057
1 fluid ounce (British)	=	28.4130 cm^3	1.453 5176

19. Volume⁻¹ [l^{-3}] or [v^{-1}]

1 liter ⁻¹	=	$9.9997 \times 10^{-4} \text{ cm}^{-3}$	4.999 9883
1 inch ⁻³	=	$6.1023 \times 10^{-3} \text{ cm}^{-3}$	(U. S.) 2.785 4962
1 foot ⁻³	=	$3.5314 \times 10^{-5} \text{ cm}^{-3}$	(U. S.) 5.547 9526
1 yard ⁻³	=	1.3079 m^{-3}	(U. S.) 0.116 5888
1 gallon ⁻¹ (U. S.)	=	$2.6417 \times 10^{-4} \text{ cm}^{-3}$	4.421 8843
1 gallon ⁻¹ (British)	=	$2.1997 \times 10^{-4} \text{ cm}^{-3}$	4.342 3624
1 quart ⁻¹ , dry (U. S.)	=	$9.0808 \times 10^{-4} \text{ cm}^{-3}$	4.958 1229
1 quart ⁻¹ , liquid (U. S.)	=	$1.0567 \times 10^{-3} \text{ cm}^{-3}$	3.023 9443
1 quart ⁻¹ (British)	=	$8.7988 \times 10^{-4} \text{ cm}^{-3}$	4.944 4224
1 (fluid ounce) ⁻¹ (U. S.)	=	$3.3814 \times 10^{-3} \text{ cm}^{-3}$	2.529 0943
1 (fluid ounce) ⁻¹ (British)	=	$3.5195 \times 10^{-3} \text{ cm}^{-3}$	2.546 4824

20. Length Degree⁻¹ [lT^{-1}]

1 inch per °F	=	4.5720 cm per °C	0.660 1071
1 foot per °F	=	54.864 cm per °C	1.739 2883
1 meter per °C	=	100.00 cm per °C	2.000 0000

21. Mass⁻¹ Degree⁻¹ [$m^{-1}T^{-1}$]

1 per gram °F	=	1.8000 per gram °C	0.255 2725
1 per pound °F	=	3.9683×10^{-3} per gram °C	3.598 6067
1 per pound °C	=	2.2046×10^{-3} per gram °C	3.343 3342

22. Area⁻¹ Time⁻¹ [$l^{-2}t^{-1}$]

1 foot ⁻² second ⁻¹	=	3.8750 $\text{cm}^{-2} \text{ hr}^{-1}$	(U. S.) 0.588 2709
1 foot ⁻² second ⁻¹	=	$1.0764 \times 10^{-3} \text{ cm}^{-2} \text{ sec}^{-1}$	(U. S.) 3.031 9684
1 mile ⁻² second ⁻¹	=	$1.2184 \times 10^{-3} \text{ cm}^{-2} \text{ yr}^{-1}$	(U. S.) 3.085 7951
1 meter ⁻² second ⁻¹	=	$3.600 \times 10^{-1} \text{ cm}^{-2} \text{ hr}^{-1}$	1.556 3025

CONVERSION FACTORS.—Continued

23. Velocity [lt^{-1}]

1 foot per second	=	30.4801	cm sec ⁻¹	(U. S.) 1.484 0158
1 foot per minute	=	0.5080	cm sec ⁻¹	(U. S.) 1.705 8645
1 mile per hour	=	44.7041	cm sec ⁻¹	(U. S.) 1.650 3472
1 mile per minute	=	2.6822×10^3	cm sec ⁻¹	(U. S.) 3.428 4984
1 meter per minute	=	1.6667	cm sec ⁻¹	0.221 8487
1 kilometer per hour	=	27.7778	cm sec ⁻¹	1.443 6975
Velocity of light	=	2.9986×10^{10}	cm sec ⁻¹	10.476 9185

24. Acceleration [lt^{-2}]

1 foot per second ²	=	30.480	cm sec ⁻²	(U. S.) 1.484 0158
1 mile per hour second	=	44.704	cm sec ⁻²	(U. S.) 1.650 3472
1 mile per hour minute	=	0.74507	cm sec ⁻²	(U. S.) 1.872 1959
1 meter per second ²	=	100.000	cm sec ⁻²	2.000 0000
1 kilometer per hour second	=	27.778	cm sec ⁻²	1.443 6975
Gravity, standard	=	980.665	cm sec ⁻²	2.991 5207
Gravity, standard	=	32.174	ft. sec ⁻²	(U. S.) 1.507 5049

25. Angular Velocity [θt^{-1}]

1 revolution per day	=	7.2722×10^{-5}	radian sec ⁻¹	5.861 6662
1 revolution per minute	=	1.0472×10^{-1}	radian sec ⁻¹	1.020 0286
1 revolution per second	=	6.2832	radian sec ⁻¹	0.798 1799
1 degree per second	=	1.7453×10^{-2}	radian sec ⁻¹	2.241 8774

26. Angular Acceleration [θt^{-2}]

1 revolution per second ²	=	6.2832	radian sec ⁻²	0.798 1799
1 revolution per minute ²	=	1.7453×10^{-3}	radian sec ⁻²	3.241 8773
1 revolution per minute second	=	0.10420	radian sec ⁻²	1.020 0286

27. Twist; Rotatory Power [θl^{-1}]

1 degree per inch	=	6.8714×10^{-3}	radian cm ⁻¹	(U. S.) 3.837 0428
1 degree per foot	=	5.7261×10^{-4}	radian cm ⁻¹	(U. S.) 4.757 8616
1 degree per centimeter	=	1.7453×10^{-2}	radian cm ⁻¹	2.241 8774
1 minute per centimeter	=	2.9089×10^{-4}	radian cm ⁻¹	4.463 7261

28. Density; Volume Concentration; Solubility (Non-gases) [ml^{-3}] or [mw^{-1}] (See also Hydrometer Tables, p. 31)

1 gram per milliliter*	=	0.999973	g cm ⁻³	1.999 9883
1 pound per inch ³	=	27.680	g cm ⁻³	(U. S.) 1.442 1621
1 pound per foot ³	=	0.016018	g cm ⁻³	(U. S.) 2.204 6183
1 pound per gallon (U. S.)	=	0.119826	g cm ⁻³	1.078 5502
1 pound per gallon (British)	=	0.099776	g cm ⁻³	2.999 0282
1 slug per foot ³ (g_s)	=	0.5154	g cm ⁻³	(U. S.) 1.712 1233
Mercury † at 0°C	=	15.5951	g cm ⁻³	1.192 9882

* Numerically equal to specific gravity $t^\circ/4^\circ$. † Internationally accepted conventional value to be used in expressing pressures in terms of columns of mercury.

29. Mass Concentration [$m_1m_2^{-1}$]

(This quantity involves two distinct units of mass; when the two units are the same, the concentration is called the "titer," or is denoted as a per cent.)

1 gram per ton (2000 pound)	=	1.1023	mg per kilogram	0.042 3042
1 gram per ton (2240 pound)	=	0.9842	mg per kilogram	1.993 0862
1 milligram per assay ton	=	*34.286	mg per kilogram	1.535 1132
1 ounce (av.) per ton (2000 lb.)	=	31.2500	mg per kilogram	1.494 8500
1 ounce (av.) per ton (2240 lb.)	=	27.9018	mg per kilogram	1.445 6320
1 pound (av.) per ton (2000 lb.)	=	500.000	mg per kilogram	2.698 9700
1 pound (av.) per ton (2240 lb.)	=	446.429	mg per kilogram	2.649 7520
1 gram per ton (metric)	=	1.0000	mg per kilogram	0.000 0000
1 karat†	=	41.667	mg per gram	1.619 7888

* Equals one troy ounce per 2000 lb. av. † 1 of gold to 24 of mixture.

30. Force [mlt^{-2}]

1 gram weight (g_s)	=	980.665	dyne	2.991 5207
1 poundal	=	1.3825×10^4	dyne	(U. S.) 4.140 6816
1 pound weight (g_s)	=	4.4482×10^4	dyne	5.648 1864
1 ton weight (2000 lb.) (g_s)	=	8.8964×10^4	dyne	8.949 2164
1 ton weight (2240 lb.) (g_s)	=	9.9640×10^4	dyne	8.998 4344

CONVERSION FACTORS.—Continued

31. Force⁻¹ [$m^{-1}l^{-1}t^2$]

1 (gram weight) ⁻¹ (g_*)	=	1.0917×10^{-3} dyne ⁻¹	3.008 4793
1 poundal ⁻¹	=	7.2330×10^{-6} dyne ⁻¹	5.859 3184
1 (pound weight) ⁻¹ (g_*)	=	2.2481×10^{-6} dyne ⁻¹	6.351 8136

32. Torque; Moment of a Force [ml^2t^{-2}]

1 pound-foot (g_*)	=	1.3558×10^7 dyne cm	(U. S.) 7.132 2022
1 pound-inch (g_*)	=	1.1298×10^6 dyne cm	(U. S.) 6.053 0210
1 kilogram-meter (g_*)	=	9.8066×10^7 dyne cm	7.991 5207
1 poundal-foot	=	4.2140×10^6 dyne cm	(U. S.) 5.624 6974

33. Stress; Pressure; Tension; Young's Modulus; Modulus of Rigidity; Modulus of Compression; Bulk Modulus; Coefficient of Skin Friction [$ml^{-1}t^{-2}$]

1 barye	=	1.0000 dyne cm ⁻²	0.000 0000
1 bar	=	$*1.0000 \times 10^6$ dyne cm ⁻²	6.000 0000
1 gram weight per cm ² (g_*)	=	980.665 dyne cm ⁻²	2.991 5207
1 kilogram weight per m ² (g_*)	=	98.0665 dyne cm ⁻²	1.991 5207
1 kilogram weight per mm ² (g_*)	=	9.8066×10^7 dyne cm ⁻²	7.991 5207
1 pound weight per in. ² (g_*)	=	6.8947×10^4 dyne cm ⁻²	(U. S.) 4.838 5173
1 pound weight per ft. ² (g_*)	=	4.7880×10^2 dyne cm ⁻²	(U. S.) 2.680 1548
1 ton (2000 lb.) weight per in. ² (g_*)	=	1.3789×10^8 dyne cm ⁻²	(U. S.) 8.139 5473
1 ton (2240 lb.) weight per in. ² (g_*)	=	1.5444×10^8 dyne cm ⁻²	(U. S.) 8.188 7653
1 ton (2000 lb.) weight per ft. ² (g_*)	=	9.5760×10^6 dyne cm ⁻²	(U. S.) 5.981 1848
1 ton (2240 lb.) weight per ft. ² (g_*)	=	10.7251×10^6 dyne cm ⁻²	(U. S.) 6.030 4028
1 centimeter of water at 4°C (g_*)	=	9.80638×10^3 dyne cm ⁻²	2.991 5090
1 inch of water at 4°C (g_*)	=	2.49082×10^3 dyne cm ⁻²	(U. S.) 3.396 3436
1 centimeter of mercury at 0°C (g_*)	=	1.33322×10^4 dyne cm ⁻²	4.124 9031
1 inch of mercury at 0°C (g_*)	=	3.38639×10^4 dyne cm ⁻²	(U. S.) 4.529 7377
1 normal atmosphere (g_*)	=	1.01325×10^6 dyne cm ⁻²	6.005 7166

* This value accords with the only internationally accepted use of this term; but "bar" has also been used to denote a pressure of one dyne per cm².

34. Stress⁻¹; Compressibility [$m^{-1}l^2$]

1 centimeter ² per gram weight (g_*)	=	1.0197×10^{-3} cm ² dyne ⁻¹	3.008 4793
1 centimeter ² per kilogram weight (g_*)	=	1.0197×10^{-6} cm ² dyne ⁻¹	6.008 4793
1 millimeter ² per kilogram weight (g_*)	=	1.0197×10^{-8} cm ² dyne ⁻¹	8.008 4793
1 inch ² per pound weight (g_*)	=	1.4504×10^{-3} cm ² dyne ⁻¹	(U. S.) 5.161 4827
1 inch ² per ton weight (2000 lb.) (g_*)	=	7.2519×10^{-9} cm ² dyne ⁻¹	(U. S.) 9.860 4527
1 inch ² per ton weight (2240 lb.) (g_*)	=	6.4749×10^{-9} cm ² dyne ⁻¹	(U. S.) 9.811 2347
1 foot ² per pound weight (g_*)	=	2.0886×10^{-3} cm ² dyne ⁻¹	(U. S.) 3.319 8452
1 (centimeter of water at 4°C) ⁻¹ (g_*)	=	1.0197×10^{-3} cm ² dyne ⁻¹	3.008 4910
1 (inch of water at 4°C) ⁻¹ (g_*)	=	4.0147×10^{-4} cm ² dyne ⁻¹	(U. S.) 4.603 6564
1 (centimeter of mercury at 0°C) ⁻¹ (g_*)	=	7.5006×10^{-5} cm ² dyne ⁻¹	5.875 0969
1 (inch of mercury at 0°C) ⁻¹ (g_*)	=	2.9530×10^{-5} cm ² dyne ⁻¹	(U. S.) 5.470 2623
1 (normal atmosphere) ⁻¹ (g_*)	=	9.8692×10^{-7} cm ² dyne ⁻¹	7.994 2834

35. Work; Energy; Heat [ml^2t^{-2}]

1 centimeter-dyne	=	1.0000 erg	0.000 0000
1 joule (absolute)	=	1.0000×10^7 erg	7.000 0000
1 joule (International) (v)	=	1.00032 joule (abs.)	0.000 1390
1 meter-kilogram (g_*)	=	9.80665 joule (abs.)	0.991 5207
1 foot-pound (g_*)	=	1.35582 joule (abs.)	(U. S.) 0.132 2022
1 liter-atmosphere (normal) (g_*)	=	101.328 joule (abs.)	2.005 7283
1 liter-atmosphere (45° lat.)	=	*101.323 joule (abs.)	2.005 7067
1 cubic centimeter-atmosphere (normal) (g_*)	=	0.101325 joule (abs.)	1.005 7166
1 horse-power hour (HP hr.) (g_*)	=	2.6845×10^6 joule (abs.)	(U. S.) 6.428 8674
1 horse-power hour (electrical, U. S., British)	=	2.6856×10^6 joule (abs.)	6.429 0413
1 cheval-vapeur heure (g_*)	=	2.6478×10^6 joule (abs.)	6.422 8845
1 kilowatt-hour (abs.)	=	3.6000×10^6 joule (abs.)	6.556 3025
1 International volt (v) faraday	=	9.6541×10^4 joule (abs.)	4.984 7097
1 International volt (v) electronic charge	=	1.5927×10^{-19} joule (abs.)	19.202 1463
1 gram calorie (20°C)	=	4.181 joule (abs.)	0.621 2802
1 gram calorie (15°C)	=	4.185 joule (abs.)	0.621 6955
1 gram calorie (mean)	=	4.186 joule (abs.)	0.621 7992
1 British Thermal Unit (39°F)	=	1060.4 joule (abs.)	3.025 4697
1 British Thermal Unit (mean)	=	1054.8 joule (abs.)	3.023 1701
1 British Thermal Unit (60°F)	=	1054.6 joule (abs.)	3.023 0878
1 Centigrade Thermal Unit (15°C)	=	1.8983×10^3 joule (abs.)	3.278 3613

* $g_{45} = 980.616 \text{ cm sec}^{-2}$.

CONVERSION FACTORS.—Continued

36. Power [ml^2t^{-3}]

1 watt (absolute)	=	1.0000 $\times 10^7$ erg sec ⁻¹	7.000 0000
1 watt (International) (v)	=	1.00032 watt (abs.)	0.000 1390
1 meter-kilogram per second (g_0)	=	9.80665 watt (abs.)	0.991 5207
1 foot-pound per second (g_0)	=	1.35582 watt (abs.)	(U. S.) 0.132 2022
1 horsepower, electrical (U. S., British)	=	*746.00 watt (abs.)	2.872 7388
1 horsepower, electrical (Continental Europe)	=	*736.00 watt (abs.)	2.866 0778
1 horsepower (HP) (g_0)	=	†745.70 watt (abs.)	2.872 5649
1 cheval-vapeur (g_0)	=	735.499 watt (abs.)	2.866 5820

* Defined in terms of the watt, commonly used in rating electrical machinery. † Defined as 550 ft. lb. per sec.

37. Action [ml^2t^{-1}]

1 Planck's quantum	=	6.554 $\times 10^{-27}$ erg sec	27.816 5064
1 volt electronic-charge second	=	2.4292 $\times 10^{14}$ quanta	14.385 4575
1 volt faraday second	=	1.4724 $\times 10^{28}$ quanta	38.168 0209
1 joule second	=	1.5258 $\times 10^{23}$ quanta	33.183 4936
1 calorie (15°C) second	=	6.3854 $\times 10^{23}$ quanta	33.805 1891
1 joule second/ N_0 *	=	2.5173 $\times 10^9$ quanta	9.400 9302
1 calorie (15°C) second/ N_0 *	=	1.0535 $\times 10^{10}$ quanta	10.022 6257

* N_0 denotes Avogadro's number, the number of molecules per gram mole.

38. Fluidity [$m^{-1}t$] (See also 39)

1 rhe	=	1.0000 poise ⁻¹	0.000 0000
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39. Viscosity [$ml^{-1}t^{-1}$]

1 poise	=	1.000 gram cm ⁻¹ sec ⁻¹	0.000 0000
1 gram weight sec cm ⁻² (g_0)	=	980.665 poise	2.991 5207
1 pound weight sec inch ⁻² (g_0)	=	6.895 $\times 10^4$ poise	(U. S.) 4.838 5173
1 pound weight sec foot ⁻² (g_0)	=	4.788 $\times 10^5$ poise	(U. S.) 2.680 1548

40. Kinematic Viscosity [l^2t^{-1}]

1 poise centimeter ² gram ⁻¹	=	1.000 cm ² sec ⁻¹	0.000 0000
1 poise inch ² gram ⁻¹	=	16.387 cm ² sec ⁻¹	1.214 5038
1 inch ² second ⁻¹	=	6.451 cm ² sec ⁻¹	(U. S.) 0.809 6692
1 poise foot ² pound ⁻¹	=	62.43 cm ² sec ⁻¹	(U. S.) 1.795 3817

41. Diffusivity; Diffusion, Coefficient of [l^2t^{-1}]

All quantities of the thing diffusing are to be expressed in terms of the same units. Heat diffusivity is numerically equal to heat conductivity divided by the product of the density times the heat capacity (per unit of mass); all must be expressed in the same system of units.

1 liter centimeter ⁻¹ day ⁻¹	=	1.1574 $\times 10^{-3}$ cm ² sec ⁻¹	2.063 4980
1 centimeter ² day ⁻¹	=	1.1574 $\times 10^{-6}$ cm ² sec ⁻¹	5.063 4863
1 inch ² sec ⁻¹	=	6.4516 cm ² sec ⁻¹	(U. S.) 0.809 6692

42. Surface Tension [mt^{-2}] (See also Capillary Constant, Table 43)

1 milligram weight per mm (g_0)	=	9.80665 dyne cm ⁻¹	0.991 5207
1 milligram weight per inch (g_0)	=	0.38609 dyne cm ⁻¹	(U. S.) 1.586 6861
1 erg per centimeter ²	=	1.00000 dyne cm ⁻¹	0.000 0000
1 erg per millimeter ²	=	100.00000 dyne cm ⁻¹	2.000 0000

43. (Capillary Constant)² [l^2]

The term "Capillary Constant" is used in two different senses; viz., either to denote $a_1 = \sqrt{\gamma/\rho g}$, or to denote $a_2 = \sqrt{2\gamma/\rho g}$. English authors generally follow the former practice, and German authors the latter; neither use the subscript. γ denotes the surface tension, g the acceleration of gravity, and ρ the positive difference in the densities of the adjacent fluids.

1 inch ²	=	6.451 cm ²	0.809 6692
1 millimeter ² (a_1^2) (g_0)	=	*9.807 dyne cm ⁻¹ per (g cm ⁻³)	0.991 5207
1 millimeter ² (a_2^2) (g_0)	=	*4.903 dyne cm ⁻¹ per (g cm ⁻³)	0.690 4907
1 inch ² (a_1^2) (g_0)	=	*6.327 $\times 10^3$ dyne cm ⁻¹ per (g cm ⁻³)	(U. S.) 3.801 1899
1 inch ² (a_2^2) (g_0)	=	*3.163 $\times 10^3$ dyne cm ⁻¹ per (g cm ⁻³)	(U. S.) 3.500 1599

* To convert a^2 , when referred to g_0 , to surface tension in dynes per cm, multiply a^2 by the factor given in this table and by the difference in the densities (gram per cm³) of the adjacent fluids; if a^2 is referred to g , multiply the resulting product by g/g_0 .

44. Thermal Conductivity [$T^{-1}mlt^{-3}$]

The dimensions practically employed in expressing this property are (Heat Area⁻¹ Time⁻¹ per Degree Length⁻¹). Other conversion factors may be obtained by combining those of Tables 35 (Heat), 22 (Area⁻¹ Time⁻¹) and 20 (Length Degree⁻¹).

1 calorie (15°) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	=	4.185 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.621 6955
1 calorie (20°) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	=	4.181 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.621 2802

CONVERSION FACTORS.—Continued

44. Thermal Conductivity [$T^{-1}ml^{-1}$].—Continued

1 British Thermal Unit (39°F) ft. ⁻² sec ⁻¹ (°F, in. ⁻¹) ⁻¹ =	5.218 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.717 5452
1 British Thermal Unit (mean) ft. ⁻² sec ⁻¹ (°F, in. ⁻¹) ⁻¹ =	5.191 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.715 2456
1 British Thermal Unit (60°F) ft. ⁻² sec ⁻¹ (°F, in. ⁻¹) ⁻¹ =	5.190 joules (abs.) cm ⁻² sec ⁻¹ (°C, cm ⁻¹) ⁻¹	0.715 1633

45. Intensity of Radiation [ml^{-2}] or [$ml^{-1}t^{-2}$]

The dimensions depend upon the point of view; when the receptor is considered, they are [Energy, Area⁻¹, Time⁻¹]; when the radiation itself is considered they are [Energy, Volume⁻¹]. Conversion from one to the other involves the velocity of propagation; if this is the velocity of light in vacuo, the factors are as given below; if the velocity is v cm sec⁻¹, the factors given must be multiplied by $v/(2.9986 \times 10^{10})$. For other units, combine these factors with those of Tables 19 (Volume⁻¹), 22 (Area⁻¹ Time⁻¹), and 35 (Energy).

1 erg cm ⁻²	=	2.9986×10^{10} erg cm ⁻² sec ⁻¹	10.476 9185
1 foot-pound ft. ⁻² (g.)	=	1.4357×10^{13} erg cm ⁻² sec ⁻¹	(U. S.) 13.157 0733

46. Luminous Intensity of a Source in a Given Direction [$\psi\omega^{-1}$]

By definition of the lumen, a source of one spherical candle power emits 4π (= 12.566) lumens. (See also Photometric Standards, in another section (consult index).)

1 candle, International	=	1.0000 Int. lumen per steradian	0.000 0000
1 pentane candle	=	1.0 Int. candle	
1 Hefner unit	=	0.9 ₀ Int. candle	
1 Carcel unit	=	9.6 Int. candle	Approximate
1 bougie decimale	=	1.0 Int. candle	
1 English sperm candle	=	1.0 Int. candle	

47. Illumination of a Surface [ψl^{-2}]

1 lux	=	1.000 lumen meter ⁻²	0.000 0000
1 meter-candle	=	1.000 lumen meter ⁻²	0.000 0000
1 phot	=	1.000×10^4 lumen meter ⁻²	4.000 0000
1 foot-candle	=	10.764 lumen meter ⁻²	(U. S.) 1.031 9684
1 lumen foot ⁻²	=	10.764 lumen meter ⁻²	(U. S.) 1.031 9684

48. Surface Brightness [$\psi l^{-2}\omega^{-1}$]

1 lumen centimeter ⁻² steradian ⁻¹	=	1.0000 lambert	0.000 0000
1 lumen foot ⁻² steradian ⁻¹	=	1.0764 millilambert	(U. S.) 0.031 9684
1 candle centimeter ⁻²	=	3.1416×10^3 millilambert	3.497 1499
1 candle inch ⁻²	=	4.8695×10^3 millilambert	(U. S.) 2.657 4807

49. Electrical Quantity; Charge; Total Electric Displacement; Flux of Induction [$e^1 m^1 l^1 t^{-1}$]; [$\mu^{-1} m^1 l^1$]

1 absolute coulomb	=	1.00010 Int. coulomb (v)	0.000 0434
1 absolute coulomb	=	1.00007 Int. coulomb (a)	0.000 0304
1 International coulomb (v)	=	0.99990 abs. coulomb	1.999 9566
1 International coulomb (a)	=	0.99993 abs. coulomb	1.999 9696
1 cgs unit	=	10.0000 abs. coulomb	1.000 0000
1 cgs unit	=	$*2.9986 \times 10^{10}$ cgse unit	10.476 9185
1 cgse unit	=	3.3349×10^{-10} abs. coulomb	10.523 0815
1 fpm unit	=	1.1758×10^2 cgs unit	2.070 3408
1 fpse unit	=	3.5839×10^3 cgse unit	3.554 3566
1 fpse unit	=	1.1952×10^{-6} abs. coulomb	6.077 4381
1 ampere-hour (abs.)	=	3.6000×10^3 abs. coulomb	3.556 3025
1 electronic charge	=	1.5921×10^{-19} abs. coulomb	19.201 9639
1 electronic charge	=	4.774×10^{-10} cgse unit	10.678 8824
1 faraday	=	9.6500×10^4 abs. coulomb	4.984 5273
1 faraday	=	9.6510×10^4 Int. coulomb (v)	4.984 5707
1 faraday	=	9.6507×10^4 Int. coulomb (a)	4.984 5577
1 faraday	=	2.89365×10^{14} cgse unit	14.461 4458

* Value of c ; experimental value = 2.9979×10^{10} (Rosa and Dorsey, *Bull. U. S. Bur. Standards*, 3: 433; 07).

50. Electrical Quantity⁻¹; Charge⁻¹; Total Electric Displacement⁻¹; Flux of Induction⁻¹ [$e^{-1} m^{-1} l^{-1} t$]; [$\mu^1 m^{-1} l^{-1}$]

1 absolute coulomb ⁻¹	=	0.99990 Int. coulomb ⁻¹ (v)	1.999 9566
1 absolute coulomb ⁻¹	=	0.99993 Int. coulomb ⁻¹ (a)	1.999 9696
1 cgs unit ⁻¹	=	0.1000 abs. coulomb ⁻¹	1.000 0000
1 cgse unit ⁻¹	=	2.9986×10^9 abs. coulomb ⁻¹	9.476 9185
1 ampere-hour ⁻¹	=	2.7778×10^{-4} abs. coulomb ⁻¹	4.443 6975
1 faraday ⁻¹	=	1.0363×10^{-5} abs. coulomb ⁻¹	5.015 4727
1 electronic charge ⁻¹	=	6.281×10^{18} abs. coulomb ⁻¹	18.798 0361

CONVERSION FACTORS.—Continued

51. Electrical Current [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]; [$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]

1 absolute ampere	=	1.00010	Int. ampere (v)	0.000 0434
1 absolute ampere	=	1.00007	Int. ampere (a)	0.000 0304
1 International ampere (v)	=	0.99990	abs. ampere	1.999 9566
1 International ampere (a)	=	0.99993	abs. ampere	1.999 9696
1 cgs unit	=	10.0000	abs. ampere	1.000 0000
1 cgse unit	=	3.3349×10^{-10}	abs. ampere	10.523 0815
1 faraday second ⁻¹	=	9.6500×10^4	abs. ampere	4.984 5273
1 International ampere (U. S. before 1911)	=	0.99916	Int. ampere (v)	1.999 6353
1 International ampere (England before 1906)	=	0.99870	Int. ampere (v)	1.999 4358
1 International ampere (England 1906-8)	=	0.99894	Int. ampere (v)	1.999 5399
1 International ampere (England 1909-10)	=	0.99990	Int. ampere (v)	1.999 9566
1 International ampere (France before 1911)	=	0.9998	Int. ampere (v)	1.999 9131
1 International ampere (Germany before 1911)	=	0.99968	Int. ampere (v)	1.999 8610

52. Electrical Potential [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]

1 absolute volt	=	0.99958	Int. volt (v)	1.999 8176
1 absolute volt	=	0.99955	Int. volt (a)	1.999 8046
1 International volt (v)	=	1.00042	abs. volt	0.000 1824
1 International volt (a)	=	1.00045	abs. volt	0.000 1954
1 cgs unit	=	1.0000×10^{-8}	abs. volt	8.000 0000
1 cgse unit	=	299.86	abs. volt	2.476 9185
1 International volt (U. S. before 1911)	=	0.99916	Int. volt (v)	1.999 6353
1 International volt (England before 1906)	=	0.99870	Int. volt (v)	1.999 4358
1 International volt (England 1906-8)	=	0.99894	Int. volt (v)	1.999 5399
1 International volt (England 1909-10)	=	0.99990	Int. volt (v)	1.999 9566
1 International volt (Germany and France, before 1911)	=	0.99968	Int. volt (v)	1.999 8610

53. Electrical Field Strength; Potential Gradient; Dielectric Strength [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}$]

1 cgs centimeter ⁻¹	=	1.0000×10^{-8}	abs. volt cm ⁻¹	8.000 0000
1 cgs inch ⁻¹	=	3.9370×10^{-9}	abs. volt cm ⁻¹	(U. S.) 9.595 1654
1 cgse centimeter ⁻¹	=	2.9986×10^8	abs. volt cm ⁻¹	2.476 9185
1 cgse inch ⁻¹	=	1.1805×10^8	abs. volt cm ⁻¹	(U. S.) 2.072 0839
1 volt inch ⁻¹	=	3.9370×10^{-1}	volt cm ⁻¹	(U. S.) 1.595 1654

54. Electrical Resistance; Surface Resistivity [$\epsilon^{-\frac{1}{2}}l^{-1}$]; [μl^{-1}]

1 absolute ohm	=	0.99948	Int. ohm	1.999 7741
1 International ohm	=	1.00052	abs. ohm	0.000 2259
1 cgs unit	=	1.0000×10^{-9}	abs. ohm	9.000 0000
1 cgse unit	=	8.9916×10^{11}	abs. ohm	11.953 8370
1 International ohm (France before 1911)	=	0.9999	Int. ohm	1.999 9566
1 Board of Trade unit (England 1903)	=	0.99984	Int. ohm	1.999 9306
1 B. A. unit	=	0.98660	Int. ohm	1.994 1420
1 "Legal ohm" of 1884 (England)	=	0.99718	Int. ohm	1.998 7727
1 Siemens unit	=	0.94073	Int. ohm	1.973 4667

55. Electrical Inductance [$\epsilon^{-\frac{1}{2}}l^{-1}$]; [μl]

1 absolute henry	=	0.99948	Int. henry	1.999 7741
1 International henry	=	1.00052	abs. henry	0.000 2259
1 cgs unit*	=	1.0000×10^{-9}	abs. henry	9.000 0000
1 cgse unit	=	8.9916×10^{11}	abs. henry	11.953 8370

* Occasionally called a centimeter.

56. Electrical Capacity [ϵl]; [$\mu^{-1}l^{-1}$]

1 absolute farad	=	1.00052	Int. farad	0.000 2259
1 International farad	=	0.99948	abs. farad	1.999 7741
1 cgs unit	=	1.0000×10^9	abs. farad	9.000 0000
1 cgse unit*	=	1.1121×10^{-12}	abs. farad	12.046 1630
1 cgs unit	=	8.9916×10^{20}	cgse unit	20.953 8370
1 absolute farad	=	8.9916×10^{11}	cgse unit	11.953 8370

* Frequently called a centimeter.

57. Electrical Volume Resistivity [$\epsilon^{-1}l$]; [μl^2l^{-1}]

1 absolute ohm-centimeter	=	0.99948	Int. ohm-cm	1.999 7741
1 International ohm-centimeter	=	1.00052	abs. ohm-cm	0.000 2259
1 cgs unit	=	9.9948×10^{-10}	Int. ohm-cm	10.999 7741
1 cgse unit	=	8.9869×10^{11}	Int. ohm-cm	11.953 6111

CONVERSION FACTORS.—Continued

57. Electrical Volume Resistivity [$\epsilon^{-1}l$]; [$\mu l^2 t^{-1}$].—Continued

1 microhm-centimeter	=	1.0000 $\times 10^{-6}$ ohm-cm	6.000 0000
1 microhm-inch	=	2.5400 microhm-cm	(U. S.) 0.404 8346
1 ohm-inch	=	2.5400 $\times 10^6$ microhm-cm	(U. S.) 6.404 8346
1 ohm (meter, millimeter ²)	=	100.0000 microhm-cm	2.000 0000
1 ohm (meter, millimeter)	=	78.540 microhm-cm	1.895 0899
1 ohm (mil, foot)	=	1.6624 $\times 10^{-1}$ microhm-cm	(U. S.) 1.220 7433
International Annealed Copper Standard (20°C)	=	1.7241 microhm-cm	0.236 5720

58. Volume Conductivity [ϵl^{-1}]; [$\mu^{-1} l^{-2} t$]

1 absolute ohm^{-1} -centimeter ⁻¹	=	1.00052 Int. ohm^{-1} cm ⁻¹	0.000 2259
1 International ohm^{-1} -centimeter ⁻¹	=	0.99948 abs. ohm^{-1} cm ⁻¹	1.999 7741
1 cgs unit	=	1.00052 $\times 10^9$ Int. ohm^{-1} cm ⁻¹	9.000 2259
1 cgse unit	=	1.11273 $\times 10^{-12}$ Int. ohm^{-1} cm ⁻¹	12.046 3889
1 microhm ⁻¹ -centimeter ⁻¹	=	1.0000 $\times 10^6$ ohm ⁻¹ cm ⁻¹	6.000 0000
1 microhm ⁻¹ -inch ⁻¹	=	3.9370 $\times 10^{-1}$ microhm ⁻¹ cm ⁻¹	(U. S.) 1.595 1654
1 ohm ⁻¹ -inch ⁻¹	=	3.9370 $\times 10^{-7}$ microhm ⁻¹ cm ⁻¹	(U. S.) 7.595 1654
1 ohm ⁻¹ (meter, millimeter ²) ⁻¹	=	1.000 $\times 10^{-2}$ microhm ⁻¹ cm ⁻¹	2.000 0000
1 ohm ⁻¹ (meter, millimeter) ⁻¹	=	1.2732 $\times 10^{-2}$ microhm ⁻¹ cm ⁻¹	2.104 9101
1 ohm ⁻¹ (mil, foot) ⁻¹	=	6.0153 microhm ⁻¹ cm ⁻¹	(U. S.) 0.779 2567
International Annealed Copper Standard (20°C)	=	0.5800 microhm ⁻¹ cm ⁻¹	1.763 4280
100% conductivity (20°C)	=	0.5800 microhm ⁻¹ cm ⁻¹	1.763 4280

* "Mho" is occasionally used instead of ohm⁻¹.59. Electrical Mass Resistivity [$\epsilon^{-1} ml^{-2} t$]; [$\mu ml^{-2} l^{-1} t$]

1 absolute ohm (meter, gram)	=	0.99948 Int. ohm (meter, gram)	1.999 7741
1 International ohm (meter, gram)	=	1.00052 abs. ohm (meter, gram)	0.000 2259
1 cgs unit	=	9.9948 $\times 10^{-6}$ Int. ohm (meter, gram)	6.999 7741
1 cgse unit	=	8.9869 $\times 10^{15}$ Int. ohm (meter, gram)	15.953 6111
1 ohm (mile, pound)	=	1.7513 $\times 10^{-4}$ ohm (meter, gram)	(U. S.) 4.243 3663
1 ohm (centimeter, gram)	=	1.0000 $\times 10^4$ ohm (meter, gram)	4.000 0000
1 ohm (centimeter, gram)	=	D^* ohm-cm	
International Annealed Copper Standard at 20°C	=	0.15328 ohm (meter, gram)	1.185 4738

* D represents the density in grams per centimeter³.† Density = 8.89 grams per centimeter³. See Table 61.60. Electrical Mass Conductivity [$\epsilon m^{-1} l^2 t^{-1}$]; [$\mu^{-1} m^{-1} l t$]

1 absolute ohm ⁻¹ (meter, gram)	=	1.00052 Int. ohm ⁻¹ (meter, gram)	0.000 2259
1 International ohm ⁻¹ (meter, gram)	=	0.99948 abs. ohm ⁻¹ (meter, gram)	1.999 7741
1 cgs unit ⁻¹	=	1.00052 $\times 10^5$ Int. ohm ⁻¹ (meter, gram)	5.000 2259
1 cgse unit ⁻¹	=	1.1127 $\times 10^{-16}$ Int. ohm ⁻¹ (meter, gram)	16.046 3889
1 ohm ⁻¹ (mile, pound)	=	5.7100 $\times 10^{-3}$ ohm ⁻¹ (meter, gram)	3.756 6337
1 ohm ⁻¹ (centimeter, gram)	=	1.0000 $\times 10^{-4}$ ohm ⁻¹ (meter, gram)	4.000 0000
1 ohm ⁻¹ (centimeter, gram)	=	$*D^{-1}$ (ohm-centimeter) ⁻¹	

* D^{-1} = reciprocal of the density in grams per centimeter³.

61. Constants of Annealed Copper as Accepted at Various Times

Data taken from U. S. Bur. Standards Circular No. 31

Temperature °C	England (Eng. Stds. Com. 1904)	Germany (Old "Nor- mal Kupfer" density = 8.91)	Germany (Old "Nor- mal Kupfer" assuming density 8.89)	Lindeck, Matthiessen, assuming density 8.89	A. I. E. E. before 1907 (Matthies- sen value)	A. I. E. E. 1907 to 1910	Bureau Standards and A. I. E. E. 1911	Inter. Annealed Copper Standard 1913
Resistivity in ohms (meter, grams)								
0	0.141362	0.139590	0.139277	0.141571	0.141729	0.141728	0.141068	0.141332
15	0.150437	0.148502	0.148164	0.149974	0.150141	0.150658	0.150034	0.150290
15.6	0.1508							
20	0.153463	0.151470	0.151130	0.152851	0.153022	0.153634	0.153022	0.15328
25	0.156488	0.154440	0.154098	0.155765	0.155938	0.156610	0.156010	0.156262
Temperature coefficient of resistance (mass constant)								
0	0.00428	0.004255	0.004255	$\frac{1}{R_0} = \frac{1}{R_0} (1 - 3.8701t \times 10^{-3}$	0.0042	0.0042	0.004277	0.004265
15	0.004022	0.004	0.004	$+ 9.009t^2 \times 10^{-6})$	0.003951	0.003951	0.004019	0.004009
20	0.003943	0.003922	0.003922		0.003875	0.003875	0.00394	0.00393
25	0.003866	0.003846	0.003846		0.003801	0.003801	0.003864	0.003854
Density								
	8.89	8.91	(8.89)	(8.89)	8.89	8.89	8.89	8.89
	15.6°						20°	20°

CONVERSION FACTORS.—Continued

62. Ionic Mobility [$\epsilon^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$]; [$\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$]

1 centimeter ² second ⁻¹ per cgse unit of potential	=	3.3349×10^{-3} cm ² sec ⁻¹ volt ⁻¹ (abs.)	$\bar{3}.523\ 0815$
1 inch ² second ⁻¹ per cgse unit of potential	=	2.1515×10^{-3} cm ² sec ⁻¹ volt ⁻¹ (abs.)	(U. S.) $\bar{2}.332\ 7507$
1 inch ² second ⁻¹ volt ⁻¹ (absolute)	=	6.4516 cm ² sec ⁻¹ volt ⁻¹ (abs.)	(U. S.) 0.809 6692

63. Thermoelectric Power [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$]

1 cgsm unit of potential per °C	=	1.0000×10^{-2} microvolt per °C (abs.)	$\bar{2}.000\ 0000$
1 cgsm unit of potential per °F	=	1.8000×10^{-2} microvolt per °C (abs.)	$\bar{2}.255\ 2725$
1 cgse unit of potential per °C	=	2.9986×10^8 microvolt per °C (abs.)	8.476 9185
1 cgse unit of potential per °F	=	5.3975×10^8 microvolt per °C (abs.)	8.732 1910
1 microvolt per °F	=	1.8000 microvolt per °C	0.255 2725

64. Peltier Coefficient [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$]

1 joule per ampere-hour (absolute)	=	2.7778×10^{-3} joule em ⁻¹	$\bar{3}.443\ 6975$
1 joule per ampere-hour (absolute)	=	9.2636×10^{-14} joule es ⁻¹	$\bar{14}.966\ 7790$
1 joule per coulomb	=	10.000 joule em ⁻¹	1.000 0000
1 joule per faraday	=	1.0363×10^{-4} joule em ⁻¹	4.015 4727
1 joule per electron	=	6.2811×10^{18} joule em ⁻¹	19.798 0361
1 calorie (15°C) per ampere-hour	=	1.1625×10^{-3} joule em ⁻¹	$\bar{2}.065\ 3930$
1 calorie (15°C) per coulomb	=	41.850 joule em ⁻¹	1.621 6955
1 millivolt	=	1.0000×10^{-2} joule em ⁻¹	$\bar{2}.000\ 0000$

65. Thomson Effect, Coefficient of; Specific Heat of Electricity [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$]

1 joule coulomb ⁻¹ per °F	=	1.8000 joule coulomb ⁻¹ per °C	0.255 2725
1 joule es ⁻¹ per °F	=	5.3975×10^8 joule coulomb ⁻¹ per °C	9.732 1910
1 joule em ⁻¹ per °F	=	0.1800 joule coulomb ⁻¹ per °C	1.255 2725
1 joule es ⁻¹ per °C	=	2.9986×10^8 joule coulomb ⁻¹ per °C	9.476 9185
1 joule faraday ⁻¹ per °C	=	1.0363×10^{-6} joule coulomb ⁻¹ per °C	$\bar{5}.015\ 4727$
1 joule electron ⁻¹ per °C	=	6.2811×10^{18} joule coulomb ⁻¹ per °C	18.798 0361
1 volt per °C	=	1.0000 joule coulomb ⁻¹ per °C	0.000 0000

66. Piezoelectric Constant [$\epsilon^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$]; [$\mu^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$]

1 em per kilogram weight (g_*)	=	3.0577×10^4 es per dyne	4.485 3978
1 em per pound weight (g_*)	=	6.7411×10^4 es per dyne	4.828 7321
1 es per kilogram weight (g_*)	=	1.0197×10^{-6} es per dyne	$\bar{6}.008\ 4793$
1 es per pound weight (g_*)	=	2.2481×10^{-6} es per dyne	$\bar{6}.351\ 8136$
1 coulomb per kilogram weight (g_*)	=	3.0577×10^3 es per dyne	3.485 3978
1 faraday per kilogram weight (g_*)	=	2.9507×10^8 es per dyne	8.469 9251
1 electron per kilogram weight (g_*)	=	4.868×10^{-16} es per dyne	$\bar{16}.687\ 3617$

67. Magnetic Field Intensity; Magnetic Potential Gradient; Magnetizing Force [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$]; [$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$]

1 gauss, absolute	=	1.00010 Int. gauss (v)	0.000 0434
1 gauss, absolute	=	1.00007 Int. gauss (a)	0.000 0304
1 International gauss (v)	=	0.99990 abs. gauss	$\bar{1}.999\ 9566$
1 International gauss (a)	=	0.99993 abs. gauss	$\bar{1}.999\ 9696$
1 cgsm unit	=	1.0000 abs. gauss	0.000 0000
1 cgse unit	=	3.3349×10^{-11} abs. gauss	$\bar{11}.523\ 0815$
1 gilbert per centimeter	=	1.0000 gauss	0.000 0000
1 ampere-turn per centimeter	=	1.2566 gauss	0.099 2099
1 ampere-turn per inch	=	0.49474 gauss	(U. S.) $\bar{1}.694\ 3753$
1 gamma, γ	=	1.0000×10^{-6} gauss	$\bar{5}.000\ 0000$

68. (Magnetic Field Intensity)⁻¹; Coefficient of Leduc Effect [$\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t^{\frac{1}{2}}$]; [$\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t^{\frac{1}{2}}$]

1 gauss ⁻¹ (absolute)	=	0.99990 Int. gauss ⁻¹ (v)	$\bar{1}.999\ 9566$
1 International gauss ⁻¹ (v)	=	1.00010 gauss ⁻¹ (abs.)	0.000 0434
1 cgsm unit ⁻¹	=	1.0000 gauss ⁻¹ (abs.)	0.000 0000
1 cgse unit ⁻¹	=	2.9986×10^{10} gauss ⁻¹ (abs.)	10.476 9185
1 centimeter per gilbert	=	1.0000 gauss ⁻¹	0.000 0000
1 centimeter per ampere-turn	=	7.9577×10^{-1} gauss ⁻¹	$\bar{1}.900\ 7901$
1 inch per ampere-turn	=	2.0213 gauss ⁻¹	0.305 6246

CONVERSION FACTORS.—Continued

69. Magnetomotive Force; Magnetic Potential [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]; [$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]

1 gilbert, absolute	=	1.00010	Int. gilbert (v)	0.000 0434
1 gilbert, absolute	=	1.00007	Int. gilbert (a)	0.000 0304
1 International gilbert (v)	=	0.99990	abs. gilbert	1.999 9566
1 International gilbert (a)	=	0.99993	abs. gilbert	1.999 9696
1 cgs unit	=	1.00000	abs. gilbert	0.000 0000
1 cgse unit	=	3.3349 $\times 10^{-11}$	abs. gilbert	11.523 0815
1 ampere-turn	=	1.2566	gilbert	0.099 2099

70. Magnetic Induction; Intensity of Magnetization [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-1}$]

Units of Magnetisation are not named

1 maxwell per centimeter ² , absolute	=	0.99958	Int. maxwell per cm ² (v)	1.999 8176
1 maxwell per centimeter ² , absolute	=	0.99955	Int. maxwell per cm ² (a)	1.999 8046
1 International maxwell per centimeter ² (v)	=	1.00042	abs. maxwell per cm ²	0.000 1824
1 International maxwell per centimeter ² (a)	=	1.00045	abs. maxwell per cm ²	0.000 1954
1 maxwell per inch ²	=	0.15500	maxwell per cm ²	(U. S.) 1.190 3308
1 cgs unit	=	1.00000	abs. maxwell per cm ²	0.000 0000
1 cgse unit	=	2.9986 $\times 10^{10}$	abs. maxwell per cm ²	10.476 9185
1 line per centimeter ²	=	1.00000	maxwell per cm ²	0.000 0000
1 line per inch ²	=	0.15500	maxwell per cm ²	(U. S.) 1.190 3308

71. Flux of Magnetic Induction; Magnetic Flux; Pole Strength; Quantity of Magnetism [$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$]; [$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$]

Units of Pole Strength and Quantity of Magnetism are not named

1 maxwell, absolute	=	0.99958	Int. maxwell (v)	1.999 8176
1 maxwell, absolute	=	0.99955	Int. maxwell (a)	1.999 8046
1 International maxwell (v)	=	1.00042	abs. maxwell	0.000 1824
1 International maxwell (a)	=	1.00045	abs. maxwell	0.000 1954
1 cgs unit	=	1.0000	abs. maxwell	0.000 0000
1 cgse unit	=	2.9986 $\times 10^{10}$	abs. maxwell	10.476 9185
1 line	=	1.0000	abs. maxwell	0.000 0000
1 volt-second	=	1.0000 $\times 10^8$	maxwell	8.000 0000

72. Magnetic Reluctance [ϵl^{-2}]; [$\mu^{-1}l^{-1}$]

1 oersted, absolute	=	1.00052	Int. oersted	0.000 2259
1 International oersted	=	0.99948	abs. oersted	1.999 7741
1 cgs unit	=	1.0000	abs. oersted	0.000 0000
1 cgse unit	=	1.1122 $\times 10^{-21}$	abs. oersted	21.046 1630

73. Hall Effect, Coefficient of [$\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}l^{\frac{1}{2}}$]; [$\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}$]

1 volt centimeter per ampere gauss (absolute)	=	1.0000 $\times 10^9$	cgsm unit	9.000 0000
1 volt inch per ampere gauss (absolute)	=	2.5400 $\times 10^9$	cgsm unit	(U. S.) 9.404 8346
1 cgse unit	=	2.6962 $\times 10^{21}$	cgsm unit	31.430 7555

74. Ettinghausen Effect, Coefficient of [$\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}l^{\frac{1}{2}}T$]; [$\mu m^{-\frac{1}{2}}l^{\frac{1}{2}}T$]

1°C centimeter per ampere gauss (absolute)	=	10.000	°C cm per cgsm unit	1.000 0000
1°F inch per ampere gauss (absolute)	=	45.720	°C cm per cgsm unit	1.660 1071
1°C centimeter per cgse unit	=	8.9916 $\times 10^{20}$	°C cm per cgsm unit	20.953 8370

75. Nernst Effect, Coefficient of [$\epsilon^{-\frac{1}{2}}l^{-\frac{1}{2}}T^{-1}$]; [$\mu l^{\frac{1}{2}}l^{-\frac{1}{2}}T^{-1}$]

1 volt per gauss °C (absolute)	=	1.0000 $\times 10^8$	cgsm unit per °C	8.000 0000
1 volt per gauss °F (absolute)	=	1.8000 $\times 10^8$	cgsm unit per °C	8.255 2725
1 cgse unit per °C	=	8.9916 $\times 10^{20}$	cgsm unit per °C	20.953 8370

76. Verdet's Constant [$\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}l^{\frac{1}{2}}\theta$]; [$\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}\theta$]

1 minute per gilbert	=	1.0000	minute per cgsm unit	0.000 0000
1 minute per ampere-turn	=	1.2566	minute per cgsm unit	0.099 2099
1 radian per gilbert	=	3.4377 $\times 10^3$	minute per cgsm unit	3.536 2739

77. Fundamental Electric and Magnetic Units

Name of quantity	1 °Cgs unit equals		Dimensions		
	Cgse units	Practical units (abs.)	Cgse system	Cgsm system	†Practical system
Electric:					
Capacity	c ²	10 ⁹ farad	$\frac{d}{\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}}$	$\mu^{-\frac{1}{2}}l^{-\frac{1}{2}}$	$IE^{-\frac{1}{2}}$
Charge, quantity	c	10 coulomb	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	It

CONVERSION FACTORS.—Continued

77. Fundamental Electric and Magnetic Units.—(Continued)

Conductivity (mass).....	c^3	$10^9 \text{ ohm}^{-1} (\text{cm, g})$	$em^{-1}l^2t^{-1}$	$\mu^{-1}m^{-1}l$	$R^{-1}m^{-1}l^2$
Conductivity (surface).....	c^2	10^9 ohm^{-1}	el^{-1}	$\mu^{-1}l^{-1}t$	R^{-1}
Conductivity (volume).....	c^3	$10^9 \text{ ohm}^{-1} \text{ cm}^{-1}$	el^{-1}	$\mu^{-1}l^{-2}t$	$R^{-1}l^{-1}$
Current.....	c	10 ampere	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Dielectric constant.....	c^2	$\dagger 10^9 \text{ ohm}^{-1} \text{ per } (\text{cm sec}^{-1})$	e	$\mu^{-1}l^{-2}t^2$	$\dagger IE^{-1}l^{-1}t$
Displacement (local).....	c	10 coulomb per cm^2	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}$	$Il^{-2}t$
Displacement (integral).....	c	10 coulomb	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	It
Electromotive force.....	c^{-1}	10^{-8} volt	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	E
Field strength.....	c^{-1}	$10^{-8} \text{ volt cm}^{-1}$	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-2}$	El^{-1}
Inductance.....	c^{-2}	10^{-9} henry	$e^{-1}l^{-1}t^2$	μl	Rt
Inductivity.....	c^2	$\dagger 10^9 \text{ ohm}^{-1} \text{ per } (\text{cm sec}^{-1})$	e	$\mu^{-1}l^{-2}t^2$	$\dagger IE^{-1}l^{-1}t$
Ionic mobility.....	c	$10^8 \text{ cm sec}^{-1} \text{ per } (\text{volt cm}^{-1})$	$e^{\frac{1}{2}}m^{-\frac{1}{2}}l$	$\mu^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$	$E^{-1}l^{\frac{1}{2}}t^{-1}$
Polarisation capacity.....	c^2	$10^9 \text{ farad cm}^{-2}$	el^{-1}	$\mu^{-1}l^{-2}t^2$	$IE^{-1}l^{-2}t$
Potential.....	c^{-1}	10^{-8} volt	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	E
Resistance.....	c^{-2}	10^{-9} ohm	$e^{-1}l^{-1}t$	$\mu l t^{-1}$	R
Resistivity (mass).....	c^{-2}	$10^{-9} \text{ ohm (cm, g)}$	$e^{-1}m l^{-2}t$	$\mu m l^{-1}t^{-1}$	$Rm l^{-2}$
Resistivity (surface).....	c^{-2}	10^{-9} ohm	$e^{-1}l^{-1}t$	$\mu l t^{-1}$	R
Resistivity (volume).....	c^{-2}	10^{-9} ohm-cm	$e^{-1}t$	$\mu l^2 t^{-1}$	Rl
Specific heat of electricity (Thomson).....	c^{-1}	$10^{-8} \text{ volt deg}^{-1}$	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}T^{-1}$	ET^{-1}
Specific inductive capacity.....	l	1	zero	zero	zero
Magnetic:					
Field intensity.....	c	1 gauss	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	Il^{-1}
Flux of induction (integral).....	c^{-1}	1 maxwell	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	Et
Induction (local).....	c^{-1}	1 maxwell cm^{-2}	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$El^{-2}t$
Intensity of magnetization (volume).....	c^{-1}	1	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$El^{-2}t$
Magnetic flux (integral).....	c^{-1}	1 maxwell	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	Et
Magnetizing force.....	c	1 gauss	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	Il^{-1}
Magnetomotive force.....	c	1 gilbert	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Permeability.....	c^{-2}	1 maxwell $\text{cm}^{-2} \text{ per gauss}$	$e^{-1}l^{-2}t^2$	μ	$I^{-1}El^{-1}t$
Pole strength.....	c^{-1}	1	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	Et
Potential.....	c	1 gilbert	$e^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Quantity.....	c^{-1}	1	$e^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	Et
Reluctance.....	c^2	1 oersted	el^{-2}	$\mu^{-1}l^{-1}$	$IE^{-1}l^{-1}$
Susceptibility.....	c^{-2}	$\frac{1}{4\pi}$ maxwell $\text{cm}^{-2} \text{ per gauss}$	$e^{-1}l^{-2}t^2$	μ	$I^{-1}El^{-1}t$

* For the purposes of International Critical Tables, c has been taken as 2.9986×10^{10} cm per sec, $\log_{10} c = 10.476\ 9185$, $\log_{10} c^{-1} = -11.523\ 0815$. This is the accepted value for the velocity of light in vacuo. The best directly determined value of the ratio of the two electrical units of quantity gives $c = 2.9979 \times 10^{10}$ cm per sec. (Rosa and Dorsey, *Bull. U. S. Bur. Standards*, 3: 433; 07.)

† In practice this unit is not used; the quantity given in essentially every instance is the dimensionless "specific inductive capacity," which is numerically equal to the dielectric constant expressed in cgs units.

‡ In this column are given the dimensions in terms of the practical electrical units, as these generally enter into the actual determinations of the several quantities. As three basic electrical units are employed, alternative expressions are possible. T = thermometric degree, E = potential, I = current, R = resistance.

78. Indicated Conversion Factors

a = area, C = electrical capacity, T = thermometric degree, d = density, E = electrical potential, e = electric charge, F = electrical field intensity, h = heat, m = mass, Q = quantity of magnetism, R = electrical resistance, t = time, v = volume, ϵ = dielectric constant, η = viscosity, θ = plane angle.

Name of quantity	Dimensions	Tables
Electricity		
Electric displacement.....	eF	14, 53
Polarization capacity.....	Ca^{-1}	56, 17
Pyroelectric constant.....	$ea^{-1}T^{-1}$	49, 17, 12
Specific inductive capacity.....	zero	
Surface density of charge.....	ea^{-1}	49, 17
Thermoelectric power.....	ET^{-1}	52, 12
Volume density of charge.....	ev^{-1}	49, 19
Heat, capacity		
Latent.....	hm^{-1}	35, 21
Reaction.....	hm^{-1}	35, 4
Superficial latent.....	ha^{-1}	35, 4
Transformation.....	hm^{-1}	35, 4

Name of quantity	Dimensions	Tables
Radiation, index of absorption.....	zero	
Intensity of.....	$ha^{-1}t^{-1}$	35, 22
Kerr's constant (magneto-optic).....	$\theta Q^{-1}a$	7, 71, 16
Reflectivity.....	zero	
Refraction, index of.....	zero	
Solubility, gases in liquids.....	zero	
Viscosity, kinematic.....	ηd^{-1}	39, 28

79. Hydrometer Scales

Unless the hydrometer is used in the liquid and at the temperature for which it is graduated, corrections must be applied for the changed capillary depression and for the expansion (or contraction) of the instrument. (The following table does not include all scales which have been used.)

T = temperature at which the instrument is to be used; r = reading of instrument; the specific gravity is with reference to water at temperature T unless another temperature is indicated in the last column.

79. Hydrometer Scales.—Continued

Hydrometer	T	Specific gravity		Remarks
		Dense	Light	
A. P. I. = American Petroleum Institute.	60°F = 15.56°C		141.5 131.5 + r	Petroleum
Balling.....	17.5°C	200 200 - r	200 200 + r	
Bates.....	60°F = 15.56°C	1000 + 2.78r 1000		
Baumé.....	10°R = 12.5°C	145.88 145.88 - r	145.88 135.88 + r	
Baumé.....	15°C	146.3 146.3 - r	146.3 136.3 + r	
Baumé.....	17.5°C	146.78 146.78 - r	146.78 136.78 + r	
Baumé.....	15°C	144.3 144.3 - r		"Rational"
Baumé.....	15°C	144.3 144.3 - r		"Rational" (water at 4°C)
Baumé-Lunge.....	12.5°C	144.32 144.32 - r	144.32 144.32 + r	"Rational"
Baumé.....	15°C	144.32 144.32 - r	144.32 144.32 + r	French (water at 4°C)
Baumé.....	60°F = 15.56°C	145 145 - r	140 130 + r	American
Beck.....	12.5°C	170 170 - r	170 170 + r	
Brix.....	12.5°R = 15.625°C	400 400 - r	400 400 + r	
Cartier.....	12.5°C	136.8 126.1 - r	136.8 126.1 + r	
Fischer.....	12.5°R = 15.625°C	400 400 - r	400 400 + r	
Fleischer.....		1000 + 10r 1000		
Gay-Lussac.....		100 100 - r	100 100 + r	
Gerlach, or "new"	17.5°C	146.78 146.78 - r		
Holland, or "old"	12.5°C	144 144 - r		
Stoppani.....	12.5°R = 15.625°C	166 166 - r		
Twaddell.....	60°F = 15.56°C	1000 + 5r 1000		British (water at 4°C)

TECHNICAL EFFLUX VISCOMETERS: INTERPRETATION AND INTERCONVERSION OF READINGS

WINSLOW H. HERSCHEL

Since changes are made from time to time in the standardization or method of operation of these instruments, and many old instruments are still in use, it is believed that in general the determination of kinematic viscosity from the readings of the instruments, and direct interconversions between instruments, when used at the same temperature, may be made by the use of Fig. 1, with as great precision (about 5%) as the data will warrant. It is assumed that the instruments are used in the normal manner. For the Saybolt instruments, a higher precision is occasionally justified, and may be obtained by the use of Table 2.

If the instruments are used at different temperatures, appropriate temperature corrections must be applied. For lubricating oils, the viscosity at one temperature may be estimated from that at another by the approximate empirical rule, applicable between 100° and 212°F (37.8° and 100°C), that the logarithmic viscosity-temperature graphs are straight and meet at a point, temperatures being expressed in degrees Fahrenheit. (For other temperatures see (1, 7, 8)). The location of the point of intersection for several classes of oils is given in Table 1.

TABLE 1.—COORDINATES OF POINTS OF INTERSECTION OF LOGARITHMIC GRAPHS⁽⁵⁾

η_0 = viscosity in poises; t_0 = temperature in °F				
Class of oils	$\log_{10} \eta_0$	η_0	$\log_{10} t_0$	t_0
Paraffin base.....	3.58	0.0038	2.77	589
Naphthene base.....	3.88	.0076	2.57	371
Mixed base.....	3.43	.0027	2.78	605
Fatty oils.....	3.75	.0056	2.82	661

In estimating the viscometer reading at a given temperature for a certain type of instrument, from an observed reading at another temperature with another type of instrument, the following steps may be taken.

1. Determine the kinematic viscosity corresponding to the observed reading by means of Fig. 1.

2. Multiply by the density (g/cm^3) so as to obtain the absolute viscosity (η) in poises; find the logarithm of the absolute viscosity and the logarithm of the temperature (t) of test (°F).

3. Plot the observed η , t and the η_0 , t_0 of the point of intersection, as given in Table 1, on logarithmic paper. Or plot the corresponding logarithms on equispaced coordinate paper. In either case, these two points locate a straight graph upon which the viscosity at the desired temperature will be found.

4. Divide the absolute viscosity at the desired temperature by the density at that temperature to get the kinematic viscosity. From this, determine, by means of Fig. 1, the corresponding time of flow on the desired viscometer.

It will be noted that the density under (2) and (4) must be the density at the temperature under consideration, and not the density at 60°F (15.6°C), which is generally the standard for such density determinations.

If an instrument is used in an irregular manner, appropriate corrections must be applied (2, 3, 6, 9).

TABLE 2.—SAYBOLT UNIVERSAL AND SAYBOLT FUROL VISCOMETERS
Units: Time (t), sec; kinematic viscosity = (η/d), poise/(g per cm^3).

Saybolt Universal		Saybolt Furol	
t	η/d	t	η/d
32	0.0115	25	0.486
40	0.0417	26	0.512
50	0.0740	27	0.537
60	0.103	28	0.562
70	0.130	29	0.586
80	0.156	30	0.610
90	0.181	35	0.730
100	0.206	40	0.846
125	0.266	45	0.960
150	0.324	50	1.072
175	0.381	60	1.292
200	0.437	70	1.507
225	0.492	80	1.724
250	0.548	90	1.939
275	0.603	100	2.155
300	0.658		

For higher viscosities the kinematic viscosity is equal to 0.00220*t* for the Saybolt Universal, or to 0.0216*t* for the Saybolt Furol.

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Fortsch and Wilson, 45, 18: 789; 24. (2) Gans, 252, 6: 218; 99. (3) Herschel, 32, No. 100; 17. (4) Herschel, 244, 10: 31; 22. (5) Herschel, 45, 14: 715; 22. (6) Holde, Examination of hydrocarbon oils, 1917. (7) Lane and Dean, 45, 16: 905; 24. (8) MacCoull, 253, 7: No. 6; 21. (9) Ubbelohde, Tabellen zum Englerschen Viskosimeter, 1907.

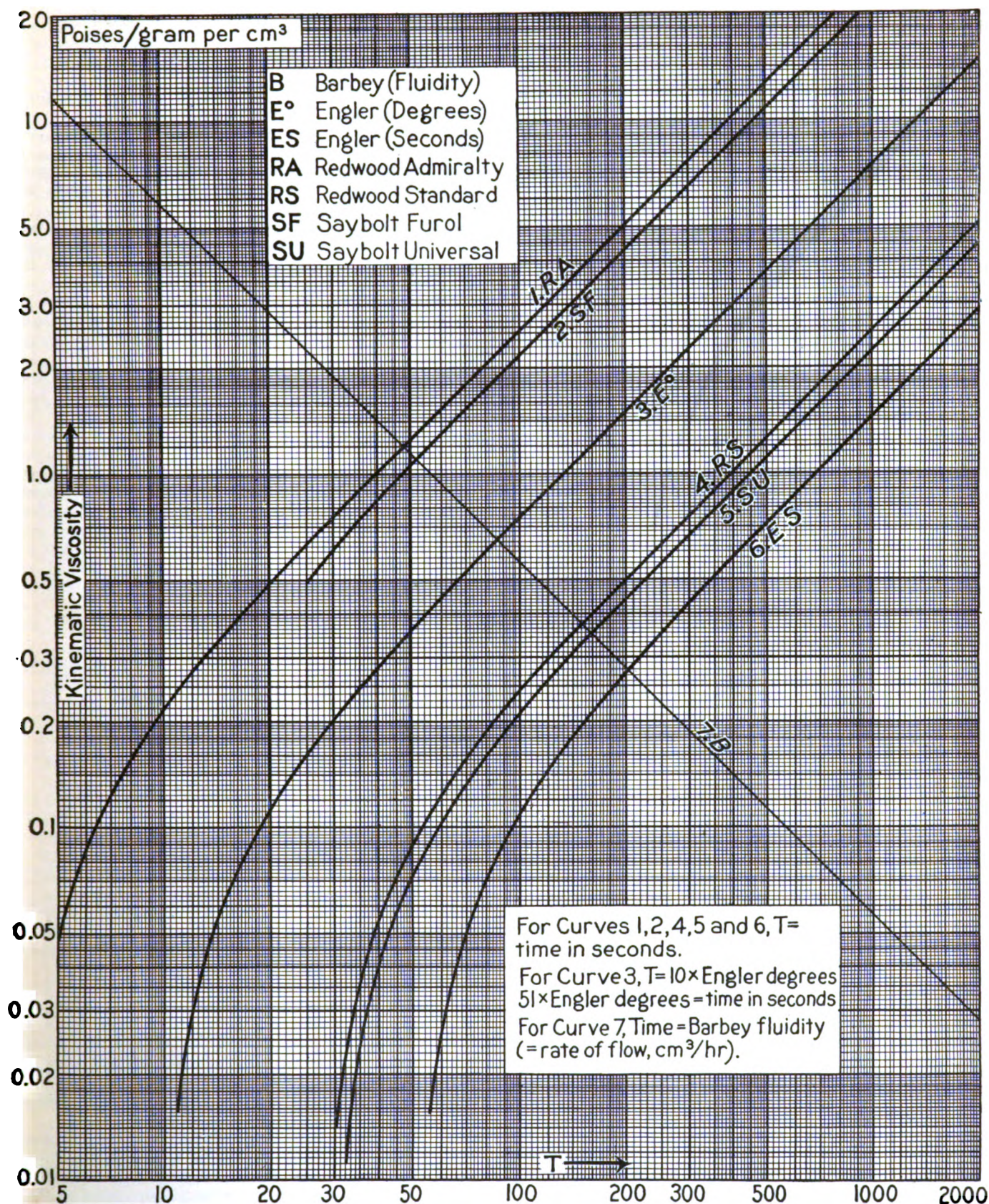


FIG. 1.—Conversion diagram for viscosimeters at a common temperature (4).

SELECTED TECHNICAL TERMS

N. ERNEST DORSEY

In this section are given the definitions of numerous units, and very brief explanations of such technical terms as occur in many sections of the I. C. T. or are for other reasons more suitably considered here than elsewhere. Other terms will be explained where they occur in the body of the work. Symbolical explanations will be given wherever they appear to be satisfactory. In many cases, dimensional formulae (see p. 18) are given; these are enclosed in []. Symbols are enclosed in (). The sequence will be: Name, symbol or symbols, dimensional formula, definition or explanation; but the symbol or formula, or both may be omitted. For the explanation of the symbols employed in the formulae and explanations, see p. 16.

Aberration, Constant of.—[θ]. $\tan (V-v)/c$. V, v = maximum and minimum velocity of earth in its orbit, c = velocity of light in vacuo.

Absolute.—(abs.). 1. An adjective, descriptive of a system of units which is based upon the smallest possible number of independent units. In this connection, every specification of a definite substance or of a vacuum is to be regarded as the introduction of an independent unit. 2. **Absolute zero.** The temperature at which the pressure of a fixed mass of an ideal gas, maintained at a constant volume, becomes zero. 3. **Absolute temperature.** The temperature reckoned from the absolute zero.

Absorption.—When the absorption of radiation by a substance is such that $J = J_0 e^{-kl}$, J, J_0 = intensity, l = length of path, k is the coefficient of absorption. k/d = coefficient of mass absorption. Writing $k = (4\pi k'n)/\lambda$, n = index of refraction, λ = wave length in vacuo, k' = index of absorption. (Some call $k'n$ the index.)

Absorptivity.—Ratio of radiant energy absorbed to that absorbed, under same conditions, by a black body.

Action, Planck's constant of.—See Planck.

Ampere.—Unit of electric current. Abs. ampere = 0.1 cgs unit.

Int. ampere is that unvarying electric current which, when passed through a solution of silver nitrate in water, in accordance with certain specifications, deposits silver at the rate of 0.00111800 gram per second.

Ampere-turn.—Unit of mmf. Difference in magnetic potential between the faces of a coil of one turn carrying one ampere.

Ångström unit.—(Å). [l]. 10^{-10} meters. International Ångström defined as such a length that wave-length of red cadmium line in air at 15°C , A_n , is exactly 6438.4696 Int. Å; it = 10^{-10} m within experimental error.

Anomalistic.—Anom. year [month] = time between successive passages of earth [moon] through perihelion [perigee].

Aphelion.—Point of planet's orbit farthest from sun.

Apogee.—Point of moon's orbit farthest from earth.

Aries, First point of.—Designation of position of vernal equinox (see Celestial sphere); not at present in constellation Aries.

Assay ton.—[m]. $29\frac{1}{6}$ grains; as many mg as there are troy ounces in short ton.

Astronomical unit of length.—Mean distance (q.v.) earth to sun; 149.50×10^6 km.

Astronomical unit of mass.—Mass of sun.

Astronomical unit of time.—Mean solar day.

Atmosphere.—[force area $^{-1}$], [m/l 2]. 1. **Normal atmosphere** (A_n) defined as pressure exerted by vertical column of liquid 76 cm long, density 13.5951 grams per cm 3 , acceleration of gravity being 980.665 cm sec $^{-2}$. 2. **Atmosphere at 45°** (A_{45}) differs from A_n only in use of acceleration of gravity at sea level

and lat. 45° instead of 980.655 cm sec $^{-2}$. 3. **British atmosphere** is based on 30 inches instead of 76 cm.

Avogadro's number.—(N_0). [m $^{-1}$]. Number of molecules in a mole.

Bar.—[force/area], [m/l 2]. Internationally accepted unit of pressure; = 10^6 dyne/cm 2 . Has also been used to denote one dyne/cm 2 (cf. Barye).

Barye.—[force/area], [m/l 2]. The cgs unit of pressure, one dyne/cm 2 . (In accordance with recommendation of special committee of International Congress of Physicists, Paris, 1900, and with the usage of the International Bureau of Weights and Measures.) (cf. Bar).

B. A. unit.—A unit of electrical resistance based on certain coils prepared in 1863–1864 by British Association for Advancement of Science.

Black Body.—One which absorbs all radiant energy incident upon it. Its radiance of wave-length λ is $J_\lambda d\lambda$; the intensity, $J_\lambda = C_1 \lambda^{-5} [e^{C_2/\lambda T} - 1]^{-1}$, T = absolute temperature, C_1, C_2 are radiation constants. Total radiance (J) is $\int J_\lambda d\lambda$ taken over all wave-lengths. $J = \sigma T^4$, σ = Stefan, or Stefan-Boltzmann constant of total radiation. For each T there is a wave-length (λ_m) for which $J_\lambda (= J_m)$ is a maximum; $J_m = C_1 T^5$, C_1 = intensity coefficient; $\lambda_m = v/T$, v = Wien's displacement constant.

Board of Trade unit.—1. A unit of electrical resistance based upon certain coils preserved by British Board of Trade. 2. (B.T.U.). Unit of work. Generally used in England as equivalent of one kilowatt-hour. (To be distinguished from British thermal unit (BTU).)

Boltzmann's molecular gas constant.—(k_0). [ml 2 /t 2 T]. Gas constant (q.v.) per molecule.

Bougie decimale.—[$\psi\omega^{-1}$]. An old unit of luminous intensity, 0.05 Violle unit.

Brightness.—[ψ /l $^2\omega$]. Luminous intensity per unit of apparent area of the luminous surface; if emission follows Lambert's law, brightness is independent of direction of line of sight, otherwise it is not; in latter case, line of sight is assumed to be normal to the surface unless the contrary is stated.

British Thermal Unit.—(BTU). [energy], [ml 2 /t 2]. Heat per pound, per $^\circ\text{F}$ of rise, required to produce small rise in temperature of water under pressure A_n ; varies with temperature, which must be stated. "Mean" BTU = $\frac{1}{2}$ of heat required to raise one lb. of water from 32°F to 212°F , pressure A_n . (To be distinguished from Board of Trade unit (B.T.U.).)

Bulk modulus.—[stress], [m/l 2]. Hydrostatic pressure divided by resulting decrease in volume per unit volume. Also called volume elasticity, cubical elasticity, resistance to compression, modulus of compression (cf. compressibility).

Calorie.—[Heat], [ml 2 /t 2]. 1. Heat per unit of mass, per $^\circ\text{C}$ of rise, required to produce small rise in temperature of water under pressure A_n ; varies with temperature, which must be stated. If unit of mass is gram, it is called small calorie, gram calorie, or calorie; symbol is cal. If unit of mass is kilogram, it is called large calorie, kilogram calorie, or Calorie; symbol, Cal. (2) **Mean calorie** = $\frac{1}{100}$ of heat required to raise unit mass of water from 0°C to 100°C , pressure A_n .

Candle.—(ca). [$\psi\omega^{-1}$]. Basic photometric unit of luminous intensity. A value determined by international agreement, and maintained at certain national laboratories by means of incandescent electric lamps is known as the "International candle."

Candle per square centimeter.—[ψ /l $^2\omega$]. Brightness of surface which, in direction considered, has a luminous intensity of one

candle per cm² of apparent area; π lamberts. Similarly: Candle per sq. in., etc.

Candlepower.—(c.p.). Luminous intensity in terms of candles.

Capacity, heat.—1. Of a substance, is heat per unit of mass, per degree of rise, required to produce a very small rise in temperature, also called **specific heat**, and **thermal capacity**. 2. Of a body, is heat, per degree of rise, required to heat the body.

Capacity, electrical.—Of body *A* with reference to body *B* is $Q/(V_A - V_B)$, all other bodies in the field being insulated and uncharged; Q = charge on *A*; V_A, V_B = potential of *A, B*.

Capacity, polarization.—Of one electrode with reference to another is its electrical capacity per unit of area.

Capillary constant.—(a). [l]. 1. **British usage:** $a_1^2 = \gamma/(d_1 - d_2)g$; γ = surface tension, g = acceleration of gravity, $(d_1 - d_2)$ = positive difference in the densities of the fluids separated by the surface. 2. **German usage:** $a_2^2 = 2\gamma/(d_1 - d_2)g$. (The subscripts to the a are usually omitted.)

Carat fine.—See Karat.

Carcel unit.—A superseded unit of luminous intensity; approximately = 9.6 Int. candles.

Celestial sphere.—Sphere, concentric with earth, serving to locate angular positions of celestial bodies; its intersection with plane of earth's orbit [equator] is called **ecliptic** [celestial equator]; intersections of ecliptic and equator are called **equinoxes**; motion of equinoxes with reference to stars is called **precession of equinoxes**, it is resultant of an oscillatory and a nearly uniform motion, a fictitious equinox possessing only the latter motion is called **mean equinox**. The mean equinox through which sun passes in spring of northern terrestrial hemisphere is called **mean vernal equinox**, and is point from which **celestial longitude** (along the ecliptic) and **mean right ascension** (R. A.) (along the equator) are measured—positive to the east. Intersections of the sphere and the axis of rotation of earth are called **celestial poles**; that of the sphere and its diameter perpendicular to plane of ecliptic called **poles of the ecliptic**. Declinations are measured from equator along great circles passing through the poles—positive towards north; **celestial latitudes**, from ecliptic along great circles passing through poles of ecliptic—positive towards north. The pole of the sphere has a motion compounded of a nearly uniform progressive motion and a rotation about a point having the former motion; that point is called **mean pole**, its motion is the **precession of the pole**, the rotation of the true pole about the mean pole is called the **nutation of the pole**; mean (angular) distance between mean pole and true pole is called **constant of nutation**.

Centi.—Prefix denoting $\frac{1}{100}$.

Centigrade.—(C). Thermometric system in which freezing point of water is called 0° and its boiling point is called 100°; pressure = A_n .

Centigrade thermal unit.—(CTU). [energy], $[ml^2/t^2]$. Differs from British Thermal Unit only in the substitution of Centigrade for Fahrenheit scale.

Centimeter.—(cm). 1. The cgs unit of length, 0.01 meter. 2. Often used to denote cgs unit of electrical capacity. 3. Occasionally used to denote cgs unit of electrical inductance.

Centimeter-dyne.—[work], $[ml^2/t^2]$. One erg.

Centimeter of water [of mercury, etc.] at t° .—[force/area], $[m/lt^2]$. Denotes pressure exerted by a vertical column of water [of mercury, etc.] one cm long, temperature t° , at a place where acceleration of gravity is g . (= 980.665 cm/sec²).

Cheval-vapeur.—[work/time], $[ml^2/t^2]$. 1. Primary definition, 75 meter-kilograms per second. Also called **force de cheval**, **continental horsepower**, **Pferdekraft**. 2. For electrical purposes, generally regarded as exactly 736 watts; may be called **continental electrical horsepower**.

Circular inch.—(cir. in.). [l^2]. Area of a circle one inch in diameter. Similarly for **circular mil** (cir. mil), **circular millimeter** (cir. mm), etc.

Compressibility.— $[l^2/m]$. Reciprocal of bulk modulus.

Compression, modulus of.— $[m/lt^2]$. See Bulk modulus.

Concentration.—1. The amount per unit of volume; may be called **volume concentration**. If amount is measured by mass, the symbol is C . 2. The mass of the material per unit of mass of the mixture containing it; may be called **mass concentration**. If both masses are expressed in terms of the same unit, this concentration is generally called the **titer of the mixture**.

Conductance.—Reciprocal of resistance.

Conductance, Specific.—See Conductivity, electrical.

Conductivity, Electrical.—Reciprocal of electrical resistivity ($q.v.$).

1. (κ) **Volume conductivity** = reciprocal of volume resistivity; **specific conductance**. 2. **Mass conductivity** = κ/d ; d = density. 3. **Equivalent conductivity** (Λ) is κ/c ; c = equivalents of solute per unit volume of solution. 4. **Molecular conductivity** (μ) is κ/m ; m = moles of solute per unit volume of solution.

Conductivity, Thermal.— $[(\text{heat/area-time})/(T/l)]$; $[ml/Tt^2]$.

$dQ/dt = -kdx dy \frac{d\theta}{dz}$; k = thermal conductivity, dQ = amount of heat through $dx dy$, in direction dz , in time dt , $d\theta$ = increase in temperature in distance dz .

Coulomb.—The quantity of electricity transferred in one second by a current of one ampere.

Critical.—1. Any point, line, or region serving to locate a well marked transition may be described as critical. 2. As regards **condensation of vapors**, the temperature corresponding to the isotherm above which liquefaction is impossible is called the **critical temperature**; the vapor pressure at which the two phases are in equilibrium at the critical temperature is the **critical pressure**; volume of unit mass at the critical pressure and temperature is the **critical volume**. These three values are called the **critical constants**.

Cubic.—(cu.), (l^3). Used in conjunction with name of unit of length to form name of a related unit of volume; e.g., **cubic meter** (cu. m) (m^3) is name of a unit of volume equivalent to volume of a cube with edges one meter long.

Cubic centimeter atmosphere.—See Liter-atmosphere.

Curie.—Internationally defined as amount of radon (radium emanation) which can exist in equilibrium with one gram of radium.

Current.—(I). The current of x through a surface S is $I = dx/dt$, where dx is the amount of x which passes through S in time dt . The density of the current through S at a given point is σ , $= dI/dS$, where dI is the current at that point through an element of S of area dS . The value of σ varies with the orientation of dS , and for a certain orientation it is a maximum. The normal, in the direction of the flux, to the element so oriented is the **direction of the current**; and this maximum value of σ is called the **density**, or the **intensity**, of the current at that point.

Dalton.— $[m]$. A unit of mass, $\frac{1}{16}$ mass of atom of oxygen. Approximately 1.650×10^{-24} grams.

Day.—(da). [t]. 1. **Solar day** = interval between successive transits of sun across same meridian. It is not of uniform length. 2. **Mean solar day** = average length of all the solar days in a tropical year. This is the basis of all our time measurements and is what is meant by day unless the contrary is definitely indicated. 3. **Sidereal day** = interval between successive transits of true vernal equinox. 4. The day defined by successive transits of same fixed star is not used in astronomical computations, and appears to have no name.

Deci.—Prefix denoting $\frac{1}{10}$.

Declination.—1. Of celestial objects. See Celestial sphere. 2. **Magnetic declination** = angular deviation of horizontal com-

ponent of earth's magnetic field from northerly measured geographic meridian; easterly deviations, positive.

Degree.—1. ($^{\circ}$), (deg). Unit of difference in temperature; size depends upon thermometric scale employed. 2. ($^{\circ}$). Unit of angle, $\frac{1}{360}$ of complete circumference. 3. ($^{\circ}$). **Hydrometer degree** is an arbitrary unit of difference in specific gravity; its value depends upon type of hydrometer (*see* p. 31).

Deka.—Prefix denoting 10.

Demal.—A concentration of one g-equivalent per dm^3 .

Density.—1. Volume density = dQ/dv , dQ = amount of the physical quantity considered which is contained in the element of volume dv . 2. Density of a substance, (d), (D), is dm/dv , m = mass. When, on a particular scale of operation, the density varies from point to point, it may be that on a larger scale it will not; then the density on the larger scale may properly be called the **apparent density** (sometimes called **bulk density**) when operations on the smaller scale are being considered. 3. Surface density = dQ/ds , ds = element of area of surface over which dQ is distributed.

Dielectric constant.—(ϵ). [$\text{l}^2/\mu\text{l}^2$], [ϵ]. The force (f) of repulsion between two point charges (e , e') of electricity at a distance (r) apart in a uniform medium of great extent is $f = ee'/\epsilon r^2$; ϵ depends upon the nature of the medium, and is called its dielectric constant.

Diffusion, Coefficient of.—*See* Diffusivity.

Diffusivity.—1. (Δ). $\left[\frac{\text{quantity}}{\text{area time}} \middle/ \frac{\text{vol. concn.}}{\text{distance}} \right]$, [l^2/l]. dQ/dt = $-\Delta(dc/dx)dydz$. dQ = amount of Q passing through area $dydz$ in direction of x in time dt , dc/dx = rate of increase, in direction of x , of volume concentration of Q . Also called **coefficient of diffusion**. 2. Heat diffusivity. $\left[\frac{\text{heat}}{\text{area} \times \text{time}} + \frac{\text{specific heat} \times \text{density} \times \text{temp.}}{\text{distance}} \right]$, $\left[\frac{\text{heat conductivity}}{\text{density} \times \text{specific heat}} \right]$, [l^2/l]. $dQ/dt = -\Delta_i cd(dT/dx)dydz$, Δ_i = heat diffusivity, c = specific heat, d = density, T = temperature. $\Delta_i cd$ = thermal conductivity. Δ_i also called **temperature conductivity**.

Displacement constant, Wien's.—*See* Black body.

Displacement, Electric.—*See* Induction, electrostatic.

Draconic month.—*See* Nodical month.

Dyne.— $[ml/\text{l}^2]$. The cgs unit of force. The force which, when acting continuously upon a mass of one gram and not opposed by another, will impart to the mass a uniform acceleration of one cm per sec.²

Dyne-centimeter.—[force · length], [ml^2/l^2]. The torque of one dyne acting on a lever-arm of one cm.

Ecliptic.—*See* Celestial sphere.

Elastic modulus.—Ratio of stress to resulting elastic strain. There are as many types of moduli as there are types of strain. 2. Occasionally used to denote **Young's modulus**.

Elasticity.—1. Cubical; *see* Bulk modulus. 2. Longitudinal; *see* Young's modulus. 3. Shear; *see* Rigidity. 4. Torsional; *see* Rigidity. 5. Modulus of; *see* Elastic modulus.

Electric displacement, field strength, etc.—*See* corresponding nouns.

Electromagnetic unit of quantity of electricity.—*See* Quantity of electricity.

Electromotive force.—(E), (emf). *See* Potential.

Electron.—Negative electrons are very small negatively charged particles observed under many, very diverse conditions. All appear to be alike in every way, including amount of charge carried. They appear to be one of the basic elements of which atoms are made.

Electronic charge.—(e). A quantity of electricity, of either sign, which is numerically equal to the electric charge carried by an electron.

Electronic mass.—(m_e). The mass of a negative electron when moving with a velocity much less than that of light.

Electronic ratio.—(e/m_e). Ratio of electronic charge to electronic mass.

Electrostatic unit of quantity of electricity.—*See* Quantity of electricity.

Elongation.—Distance of an oscillating, or of a revolving, body from a point of reference; *e.g.*, the distance of an electron from the nucleus about which it revolves.

Emissivity.—Ratio of radiance of the body to that of a black body at same temperature. If radiation of only one wave-length is considered, it is **monochromatic emissivity**; if all wave-lengths, it is **total emissivity**. The ratio of the radiances (or of the emissivities) of two non-black bodies is called **relative emissivity** of first with respect to second.

English sperm candle.—*See* Sperm candle.

Equation of time.—*See* Time.

Equator.—1. The intersection of surface of the earth, or other rotating spheroid, with the plane through its center perpendicular to its axis of rotation. 2. The intersection of the surface of a spheroid with a plane through its center and perpendicular to any diameter chosen as axis. 3. Celestial equator. *See* Celestial sphere.

Equinox.—*See* Celestial sphere.

Equivalent.—(equiv). Electrochemical equivalent (briefly equivalent) of an ion—actual or potential—is its formula weight divided by its valence.

Erg.—[force · distance], [ml^2/l^2]. Work done by a force of one dyne while acting through a distance of one centimeter in its own direction.

Erg-second.—[work · time], [ml^2/l]. The action produced by one dyne acting through one cm in one sec.

Expansion, coefficient of.—*See* Expansivity.

Expansivity.— $[T^{-1}]$. 1. Volume expansivity = $dv/(vdT)$. 2. Linear expansivity = $dl/(ldT)$. v , l , T = volume, length, temperature; $dv[d\text{l}]$ is change in $v[l]$ produced by change dT in temperature.

Fahrenheit.—(F). A thermometric system in which 32° denotes the freezing, and 212° , the boiling point of water under pressure of A_n .

Farad.—Capacity of electrical condenser which is charged to a potential difference of one volt by one coulomb.

Faraday.—(F). A subsidiary unit, the electrical charge carried in electrolysis by one gram-equivalent.

Field.—The field of a physical quantity is the region of space within which phenomena characteristic of the quantity exist. The strength, or intensity, of the field at any point is measured by the magnitude at that point of some chosen, characteristic phenomenon, and the complete designation of the field includes an indication of this phenomenon; *e.g.*, electrical field of force. As force is the phenomenon most frequently chosen, and in other cases the context indicates what is intended, the explicit designation of the chosen phenomenon is quite frequently omitted.

Field intensity.—The strength, or intensity, of a field of force at any point is $d\text{f}/dm$, where $d\text{f}$ is the mechanical force experienced by dm , a vanishingly small amount of m placed at that point. For an electrical field, m is positive electricity; for a magnetic field it is a north magnetic pole; for a gravitational field it is mass. Magnetic field strength is frequently called **magnetizing force**.

Fluidity.—(ϕ). Reciprocal of viscosity. Also called **coefficient of fluidity**.

Flux.—1. Flux (ψ) of vector (V) through surface S is $\psi = \int_S V_n dS$; V_n = component of V normal to dS , integral is to be taken over S . 2. Flux of a quantity Q through surface is $\psi = dQ/dt$,

dQ = amount of Q which passes through S in time dt . 3. From point source. If $V = I/r^2$, where r = distance from source and I is a constant independent of direction, I is called intensity of the source, and $\psi = I\omega$; ω = solid angle subtended, at the source, by S (cf. Intensity, luminous).

Flux, Luminous.—(ψ). Flux of radiant energy expressed in terms of its power to produce luminous sensation in the human eye.

Flux, Magnetic.—Flux of magnetic induction.

Foot-candle.— $[\psi/l^2]$. Unit of illumination, one lumen per square foot.

Foot-lambert.— $[\psi/l^2\omega]$. Unit of brightness; see Lambert.

Foot-pound.— $[ml^2/t^2]$. Work required to raise one pound a vertical distance of one foot, where $g = 980.665 \text{ cm/sec}^2$ (cf. meter-kilogram).

Foot-poundal.— $[ml^2/t^2]$. Work done by force of one poundal ($q.v.$) acting through a distance of one foot.

Force.— $[ml/t^2]$. That which imparts acceleration to material bodies.

Force, Electromotive.—See Potential.

Force, Magnetizing.—See Field intensity.

Force, Magnetomotive.—See Potential.

Force de cheval.—See Cheval-vapeur.

Frequency.—(ν). $[N/t]$. Number per unit of time. In case of vibrations, waves, etc., the frequency is the number of complete vibrations, of complete waves, etc., per unit of time.

Gamma.—(γ). $[\sqrt{m/\mu l^3}]$, $[\sqrt{m\epsilon/t^4}]$. A unit of magnetic field intensity; 0.000 01 gauss.

Gas constant.—1. (R). $[\text{work/mass-degree}]$, $[l^2/t^2T]$. The coefficient R in the ideal gas equation $pV = RTm$; p = pressure, V = volume of the mass m at absolute temperature T . 2. (R). $[\text{work/mole-degree}]$. Gas constant per mole obtained by expressing m in moles. 3. (k). $[\text{work/molecule-degree}]$, $[ml^2/t^2T]$. Boltzmann's molecular gas constant: obtained by expressing m in terms of number of molecules.

Gas, Ideal.—One which strictly satisfies the equation ($pV = RTm$) and other relations deduced from the classical kinetic theory of gases on the assumption that the molecules are infinitely small and devoid of mutual attraction.

Gauss.— $[\sqrt{m/\mu l^3}]$, $[\sqrt{m\epsilon/t^4}]$. The cgs unit of magnetic field intensity.

Gaussian gravitation constant.—The square root of the intensity of the gravitational field of force of the sun at a point whose distance from the sun is the astronomical unit of length (cf. Gravitation constant).

Geepound.—See Slug.

Gilbert.— $[\sqrt{ml/\mu t^2}]$, $[\sqrt{eml^2/t^4}]$. Electromagnetic unit of magnetic potential, of magnetomotive force. Unless contrary is indicated, it is the cgs unit. In precise work, the International gilbert, based upon the Int. elec. units, should be distinguished from the absolute, or cgs, gilbert.

Grade.— $[\theta]$. Unit of plane angle, $1/400$ of complete circumference.

Gram atom.—See Mole.

Gram calorie.—See Calorie.

Gram equivalent.—See Mole.

Gram formula weight.—See Mole.

Gram weight.—See Weight.

Gravitation constant.—(G). $[l^3/m t^2]$. The coefficient G occurring in the equation $f = G(mm')/r^2$; f = force of gravitational attraction between two point masses (m , m') in vacuo, r = distance between m and m' (cf. Gaussian gravitation constant).

Gravity, Acceleration of.—(g), (g_s). $[l/t^2]$. Unless the contrary is indicated, this expression refers specifically to the earth, and denotes the resultant acceleration downward experienced by a freely falling body placed at the point considered. It includes centrifugal effects arising from the rotation of the

earth, as well as the effects of gravitational attraction (cf. Gravity, standard).

Gravity, Specific.—See Specific gravity.

Gravity, Standard.—(g_s). $[l/t^2]$. Standard gravity is the value adopted by the International Committee on Weights and Measures as the "accepted" value of the acceleration of gravity to which all measurements involving this quantity are to be referred. Thus a pressure of x cm of mercury at $t^\circ\text{C}$ is to be understood as denoting the pressure exerted by x cm of mercury at $t^\circ\text{C}$ at a place where the acceleration of gravity is g_s . The accepted value is $g_s = 980.665 \text{ cm/sec}^2 (= 32.174 \text{ ft./sec}^2)$.

Heat.—1. By the heat of a process is meant the amount of heat evolved, per unit quantity of material involved, during the isothermal process, the process proceeding in the direction indicated. The quantity of material may be expressed in terms of mass, of moles, of equivalents, etc., as may seem desirable. 2. By the latent heat of a transformation is meant the amount of heat absorbed per unit quantity of material transformed, the transformation proceeding in the direction indicated. Latent heat of transformation of A to $B = -(\text{heat of transformation of } A \text{ to } B) = \text{heat of transformation of } B \text{ to } A$.

Heat diffusivity.—See Diffusivity.

Heat, Specific.—See Capacity, and Specific heat.

Hecto.—Prefix denoting 100.

Hefner unit.—A superseded unit of luminous intensity; approximately = 0.9 Int. candles.

Henry.— $[\mu l]$, $[t^2/d]$. Unit of electromagnetic inductance. Defined as that inductance for which an induced electromotive force of one volt is produced when the inducing current is changed at the uniform rate of one ampere per second.

Horsepower.—(h.p.). $[\text{work/time}]$, $[ml^2/t^3]$. 1. (HP) Primary definition of the term is work done at the rate of 550 foot-pounds per second. 2. For electrical purposes it is regarded as exactly = 746 watts, which is frequently called the electrical horsepower. 3. Continental horsepower. See Cheval-vapeur.

Humidity.—1. Absolute humidity of a gas is the actual amount of water vapor per unit volume of the gas. Usually expressed in terms of the actual pressure of the water vapor present. 2. Relative humidity of a gas = ratio of the pressure of water vapor present to the pressure of water vapor which is in equilibrium with water at the same temperature. 3. Dew-point of a gas is the temperature at which the pressure of water vapor in equilibrium with water is equal to the actual pressure of the water vapor contained in the gas. If the temperature of the gas be varied while its absolute humidity remains unchanged, then the dew-point is that temperature at which the relative humidity is 100%. 4. If the bulb of a thermometer be encased in a fabric which is kept wet with water (wet-bulb), the thermometer will record a lower temperature than if the bulb were dry (dry-bulb). If the circulation over the wet bulb is sufficiently rapid, the difference in the temperatures depends solely upon the total pressure of the gas, its absolute humidity, and its temperature. Hence the humidity of the atmosphere, or of any other very large volume of gas, can be readily determined by the use of wet- and dry-bulb thermometers.

Hydrometer.—An instrument which, by the extent of its submergence, indicates the specific gravity of the liquid in which it floats. Frequently, its readings are expressed in degrees ($^\circ$). Various systems of graduations are in use, see p. 31.

Hygrometric.—Pertaining to humidity of atmosphere.

Hypsometry.—The art of measuring the elevation above sea-level. More specifically, the use of the boiling-point of water for such measurements.

Ice point.—(T_0). Temperature at which water freezes when under the pressure of one normal atmosphere.

Ideal gas.—See Gas, ideal.

Illumination.— $[\psi/l^2]$. The illumination at a point of a surface is the surface density of the luminous flux incident at that point.

Inch of water [of mercury, etc.] at t° .—Analogous to cm of water ($q.v.$)

Index of absorption.—See Absorption.

Index of refraction.—See Refraction.

Inductance.—The electrical inductance of circuit A with reference to circuit B is ψ_A/I_B ; ψ_A = flux of magnetic induction through A as a result of the current I_B in B . A and B may be the same circuit.

Induction.—1. That modification which is acquired by a medium when it becomes the seat of a field of force, and which is evidenced by the fact that its boundaries with other media exhibit distinctive properties which they do not possess in the absence of the field. 2. The distinctive properties mentioned in (1); as in magnetization by induction, induced electric charges, etc. 3. **Electrostatic induction.** $[\sqrt{m/\mu l^2}]$, $[\sqrt{\epsilon m/l^2}]$. ϵF , ϵ = dielectric constant, F = intensity of electrostatic field of force. **Electric displacement** = $\epsilon F/4\pi$. 4. **Magnetic induction (B).** $[\sqrt{\mu m/l^2}]$, $[\sqrt{m/d^2}]$. $B = \mu H$, μ = magnetic permeability, H = intensity of magnetic field of force. 5. **Electromagnetic induction** is the phenomenon which is characterized by the appearance, in every circuit, of a cyclical emf which is proportional to the rate of change of the flux of magnetic induction through that circuit.

Intensity coefficient.—See Black body.

Intensity, Field.—See Field intensity.

Intensity, luminous.—1. Of a point source in a given direction = amount of luminous flux, per unit of solid angle, which the source emits in the direction considered. 2. Of a point of an extended source = brightness of that point of the source; also called intrinsic brightness. 3. Of an extended source, in a given direction, is its intensity at a point so distant in the stated direction that the source may be regarded as a point. For nearer points the apparent intensity will depend upon the distance, and is defined as the intensity of that point source which at the same distance will produce the same illumination (*cf.* flux).

Intensity of magnetization.—See Magnetization.

Intensity of radiation.—1. The intensity of the radiation emitted in a specified direction by a body is the amount of radiant energy emitted in that direction, per unit of time, per unit of area, and per unit of solid angle of emission. For spectral, or monochromatic, intensity, See Radiance. 2. Of received radiation, See Irradiation. 3. Of radiation in transit. The amount of radiant power per unit area which passes through an element of area which is normal to the direction of propagation; this equals the volume density of radiant energy at the point considered.

International electrical units.—A system of electrical and magnetic units based upon the ohm, the ampere, and secondarily upon the volt, all as realized by certain concrete standards which have been internationally agreed upon, and upon the cgs units for such other quantities as may be involved. The concrete standards have been so chosen as to make the international system nearly identical with the practical system; as now defined, the outstanding discrepancy in no case exceeds 52 parts in 100 000. In distinguishing between the two systems, the units of the practical system are described as absolute, those of the other, as international. The introduction of the volt as a secondary unit defined by a concrete standard (Weston normal cell = 1.018300 Int. volts at 20°C) introduces confusion when measurements of high precision are to be recorded. In these Tables, values based upon the Int. ohm and the Int. ampere (as defined by the silver voltameter) are

denoted by (a). Those based on the Int. ohm and the Int. volt (as defined by the standard cell) are denoted by (v).

Irradiation.—The radiant power, per unit of area, incident upon a surface.

Joule.— $[ml^2/t^2]$. 1. Absolute joule = 10^7 ergs. 2. International joule = work expended per second by an Int. ampere in an Int. ohm.

Karat.—(K). Denotes the "fineness of gold" in terms of parts (by weight) of gold per 24 parts of the alloy. Twenty-four g of an n karat alloy contains n g of gold, the alloy is " n carats fine."

Kelvin.—(K). Name applied to the absolute centigrade scale of temperature.

Kilo.—Prefix denoting 1000.

Kilogram calorie.—See Calorie.

Kilogram-meter.—A torque equivalent to that of one kilogram weight acting on a lever-arm one meter long.

Kilowatt-hour.—Work expended by one kilowatt in one hour. In Great Britain it is quite generally called Board of Trade unit (B.T.u.).

Kinematic viscosity.— $[l^2/t]$. Ratio of viscosity to density.

Lambert.— $[\psi/l^2\omega]$. The brightness of a surface which, radiating in accordance with Lambert's law, emits a total luminous flux of one lumen per cm^2 . For such a surface, brightness is independent of direction of the line of sight and equals $1/\pi$ lumen, per steradian, per $\text{cm}^2 = 1/\pi$ candles per cm^2 . If the total emission is one lumen per sq. ft., the brightness is called one foot-lambert.

Lambert's law.— $I = I_0 \cos \theta$; I_0/I = intensity of radiation emitted in direction normal [at angle θ with normal] to the surface. In many cases this law does not express the facts.

Latent heat.—(l , L). See Heat.

Latitude.—(lat.). 1. The angular distance of a point from the equator of a spheroid, measured along a great circle passing through the poles. 2. Celestial latitude. See Celestial sphere.

Legal ohm.—A unit of resistance; so designated by the International Conference of 1884, and defined as the resistance of a column of mercury 1 mm² in cross-section and 106 cm in length at the temperature of melting ice. It was never legalized.

Light-year.—Distance traveled by light in free space in one year.

Line.—Unit of flux of magnetic induction = one maxwell.

Liter-atmosphere.—The amount of external work done when a volume is increased by one liter against an external pressure of one atmosphere.

Longitude.—(long.). 1. The longitude of a point is the angle which its axial plane makes with a fiducial one. For the earth, angles measured from the fiducial plane towards the west are usually considered positive. 2. Celestial or astronomical longitude. See Celestial sphere.

Loschmidt's number.—(n_0). $[l^{-3}]$. Number of molecules per unit volume of an ideal gas at 0°C and pressure A_n .

Lumen.— $[\psi]$. Fundamental unit of luminous flux. A uniform point source of one candle emits 4π lumens.

Luminous flux.—See Flux, luminous.

Luminous intensity.—See Intensity, luminous.

Lunar month.—The time which elapses between successive new moons. Also called synodical month.

Lux.—A unit of illumination, one lumen per square meter.

Magnetic flux.—See Flux, magnetic.

Magnetic induction.—See Induction.

Magnetic moment.—See Moment.

Magnetization, Intensity of.—Magnetic moment per unit of volume (*cf.* moment).

Magnetomotive force.—(mmf). See Potential.

Magnitude.—The magnitude, or apparent magnitude, (m) of a star is primarily an indication of the amount of light the earth receives from it. The value to be assigned to the latter depends upon the characteristics of the perceptive apparatus: visual, photovisual, photographic, and radiometric magnitudes are to be distinguished. Certain stars near the north pole have been chosen as standards; the numerical magnitudes assigned to them are such as represent satisfactorily the range covered by early naked-eye estimates, and satisfy the equation $m = 2.5 (\log_{10} I_0 - \log_{10} I)$, I = intensity of light from a star of magnitude m , and I_0 = that from one of magnitude zero. For Vega, $m = 0.2$; a star of $m = 6$ is near the limit of naked-eye visibility. The absolute magnitude M is internationally defined as the apparent magnitude the star would have if its distance were 0.1 parsec; $M = m + 5 + 5 \log_{10} \pi$, π = parallax expressed in ''.

Mass, Engineers' unit of.—See Slug.

Maxwell.—The cgs unit of flux of magnetic induction.

Mean distance.—In astronomical parlance, the mean distance of a planet from the sun denotes the mean of the greatest and the least distance from the sun to the path of the planet. Similarly in other cases.

Mean spherical candlepower.—Average candlepower of a source, in all directions.

Mega-—Prefix = 1 000 000.

Megmho.—Conductance of one reciprocal microhm.

Meter-candle.—The illumination of an element of surface one meter distant from a uniform source of one candle situated upon the normal to the center of the element. One lux.

Meter-kilogram.— $[ml^2/t^2]$. Work required to raise one kilogram a vertical distance of one meter at a place where the acceleration of gravity is 980.665 cm/sec.²

Mho.—An electrical conductance of one reciprocal ohm.

Micro-—Prefix denoting $1/10^6$.

Microhm.— 10^{-6} ohm.

Micromicro-—Prefix denoting $1/10^{12}$.

Micron.—(μ). Unit of length = $1/10^6$ m = 0.001 mm.

Mil.—0.001 in. (cf. Circular inch).

Milli-—Prefix = 0.001.

Millimicro-—Prefix = 0.000 000 001.

Minute.—1. (min). Time, $1/1440$ of a day. 2. ('). Unit of angle, $1/60$ degree. 3. ("). Centesimal minute = unit of angle = 0.01 grade.

Modulus.—1. See Elastic modulus. 2. For the several elastic moduli—bulk, compression, elasticity, rigidity, torsion, Young's—see distinguishing name.

Mohs.—An arbitrary scale of hardness based upon a selected list of 10 native minerals.

Mole.—A variable, derived unit of mass; its mass is numerically equal to the molecular weight of the substance measured. The expressions gram-mole, kilogram-mole, etc. are used to designate the basic unit of mass employed. Similarly derived units based upon the atomic weight, the formula weight, or the equivalent are called the gram-atom, gram-formula weight or gram-equivalent when the gram is the basic unit, and correspondingly in other cases.

Molecular.—For molecular properties, see appropriate properties.

Molecular volume.—Volume occupied by one mole. Molecular weight divided by density.

Molecular weight.—(M). The sum of the atomic weights of all the atoms contained in a molecule.

Moment.—1. Of force (F) about a point = Fl , l = perpendicular distance from the point to the line of F . 2. Of a couple = product of either force times perpendicular distance between them. 3. Of a magnet = moment of couple acting upon it when it is at right angles to a magnetic field of unit intensity. 4. Of inertia about an axis = sum of the products

of each element of mass times the square of its distance from the axis.

Month.—1. Period of time determined by motion of moon. See lunar, synodical, tropical, sidereal, anomalistic, nodical, draconic. 2. Solar month = $1/12$ of tropical year. 3. Calendar month = conventional subdivision of year.

Myria-—Prefix = 10 000.

Node.—1. A point of a standing wave where the displacement is independent of the time. 2. In astronomy, the points where an orbital, or other, plane cuts the ecliptic; the rising node is the one at which the passage across the plane of the ecliptic is from south to north.

Nodal month.—Time required by the moon to pass from one rising node to the next. Also called draconic month.

Noon.—See Time.

Normal.—1. The normal to a surface is a line drawn perpendicular to the surface at the point considered. 2. Any line perpendicular to another may be said to be normal to it. 3. A concentration of one gram-equivalent per liter.

Normal atmosphere.—(A_n). See Atmosphere.

Numeric.—(N). A pure number. A dimensionless quantity.

Nutation.—See Celestial sphere.

Oersted.—The cgs unit of magnetic reluctance.

Ohm.—(Ω). A unit of electrical resistance. 1. Absolute ohm = 10^9 cgs units. 2. International ohm is the resistance, at the temperature of melting ice, offered to an unvarying electric current by a column of mercury, of constant sectional area, having a mass of 14.4521 grams and a length, at the temperature mentioned, of 106.300 cm.

Ohm-centimeter.—Unit of electrical volume resistivity. The resistivity of a material of which a uniform bar one cm² in sectional area has a longitudinal resistance of one ohm per cm of length. Frequently called one ohm per centimeter cube.

Ohm (cm, gram).—Unit of electrical mass resistivity. The resistivity of a material of which a bar, having such a uniform section that its mass per linear cm is one gram, has a longitudinal resistance of one ohm per cm of length.

Ohm (meter, mm).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one mm in diameter has a longitudinal resistance of one ohm per meter.

Ohm (meter, mm²).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one square mm in sectional area has a longitudinal resistance of one ohm per meter.

Ohm (mil, ft.).—Analogous to ohm (meter, mm). Cylinder one mil in diameter, resistance of one ohm per foot.

Ohm (mile, pound).—Analogous to ohm (cm, gram).

Ohm-inch.—Analogous to ohm-centimeter.

Parallax.—1. The annual parallax of a star is defined as the maximum angle subtended by one astronomical unit of length at the distance of the star from the sun. 2. The equatorial horizontal parallax of a member of the solar system is the maximum angle subtended by the equatorial radius of the earth at the distance of the earth from the member considered.

Parsec.—The distance of a star for which the annual parallax is one second of arc.

Pentane candle.—A superseded unit of luminous intensity = one Int. candle.

Percent.—(%). The number of units of the constituent in 100 units of the mixture containing it. If units of volume are used, the ratio is called volume percent; if units of mass, it is called mass percent, weight percent, or simply percent. (%) must be distinguished from ‰ which is frequently used to denote per thousand.)

Perigee.—That point of the moon's orbit which is nearest to the earth (cf. apogee).

Perihelion.—That point of a planet's, or comet's, orbit which is nearest to the sun (*cf.* aphelion).

Permeability.—(μ). The force (f) of repulsion between two rigidly magnetized poles (m, m') at a distance r apart is $f = (mm')/(\mu r^2)$; μ depends upon the material in which the poles are immersed, and is called its permeability.

Pferdekraft.—*See* Cheval-vapeur.

Phot.—An illumination of one lumen per cm^2 .

Photoelectric constant.—1. h/e . It is $1/\nu$ of the rise in potential required to impart to a negative electron the energy it has when emitted under the action of radiation of frequency ν . 2. hc/e . This is λ times the rise in potential mentioned in (1). λ = wave-length in vacuo.

Planck's constant of action.—(h). [ml^2/t]. A universal constant which fixes the amount of energy contained in the individual bundles, or quanta, of radiation emitted by a radiating body. Each such bundle contains an amount of energy = $h\nu$, ν = vibration frequency of the radiation. h is also called **Planck's quantum**.

Poise.— $[m/lt]$. The cgs unit of viscosity. If the tangential force, per unit area, which one layer of a fluid exerts upon an adjacent one is one dyne when the space rate of variation of the tangential velocity from layer to layer is unity, the viscosity of the fluid is one poise.

Poisson's ratio.—If a bar of uniform section be subjected to a pure tensile stress, the ratio of its transverse contraction per unit of transverse thickness to its elongation per unit of length is called the Poisson's ratio of the material.

Pole strength.—*See* Quantity of magnetism.

Poncelet.—Unit of power = 100 meter-kilograms per second.

Potential.—The excess of the potential at the point A over that at B , with reference to any quantity m , is the mechanical work per unit of m which must be done in carrying a very small positive amount of m from B to A . The difference in electrical potential is called **electromotive force, emf, potential difference**; in magnetic potential, is called **magnetomotive force, mmf**.

Potential gradient.—The space rate of increase in the potential. If the direction in which the rate to be measured is not stated, that corresponding to the maximum gradient is to be understood.

Pound weight.—*See* Weight.

Poundal.—The unit of force in the fps system. It is the force which, if acting continuously upon a mass of one pound, will impart to it a uniform acceleration of one foot per second² (*cf.* Dyne).

Power.—1. The time rate of doing work. 2. If when the two junctions of a bimetallic circuit differ in temperature by a small amount (dt), there is an open circuit emf (dE) around the circuit, then $(dE)/(dt)$ is called the **thermoelectric power** of the circuit, corresponding to the average temperature of the two junctions. 3. The ability to do some specific thing; as in rotatory power.

Practical electric units.—A system of electrical units based upon 10^9 cm, 10^{-11} gram, sec, and the permeability of a vacuum, as fundamental units. The units of most interest are the ohm (= 10^9 cgs), ampere (= 0.1 cgs), and volt (= 10^8 cgs). Frequently described as absolute (*cf.* Int. elec. units).

Precession of the equinoxes.—*See* Celestial sphere.

Pressure.—(p), (P). [m/lt^2]. Normal force per unit of area. A **hydrostatic pressure** is a pressure which is the same in all directions. For critical pressures, *see* Critical.

Quadrant.—1. Unit of angle = 90° . 2. Formerly used occasionally to denote the henry.

Quantity of electricity.—1. (es). The electrostatic unit is that quantity which when concentrated to a point and placed at unit distance from an equal point charge will exert upon it a

unit force, the surrounding medium being a vacuum. 2. (em). The **electromagnetic unit** is that quantity which is transferred per unit of time across any section of an infinitely long, straight, linear conductor when the current is such that the intensity of the resulting magnetic field at unit distance from the conductor is unity. 3. For other units—coulomb, electronic charge, faraday—*see* corresponding names.

Quantity of magnetism.—Also called **pole strength**. 1. The **electromagnetic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an equal point pole will exert upon it a unit force, the surrounding medium being a vacuum. 2. The **electrostatic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an infinitely long, straight, linear conductor would experience a unit force as a result of a current in the conductor such that one electrostatic unit of electricity per second is transferred across each section of the conductor. 3. The **Int. electric unit** is not named, it is the same as the cgs unit.

Quantum.—1. Certain processes are essentially discrete, and consequently parcel out into bundles the several quantities involved. If for a certain quantity and a particular process these bundles are all alike, it is now customary to call them quanta, without implying that the quantity so bundled has in itself any atomistic properties. 2. **Planck's quantum.** *See* Planck.

Radian.—An angle which encloses, of the circumference of a concentric circle, an arc = radius.

Radiance.—The radiance of a body, within the spectral range λ_1 to λ_2 , is defined as the intensity of the radiant energy, having wave-lengths lying between λ_1 and λ_2 , which the body emits in a direction perpendicular to its radiating surface. If the spectral range is not mentioned, all wave-lengths are to be included; this is frequently called the **total radiance**. The **spectral, or monochromatic, intensity** of the radiance of wave-length λ is defined as the ratio of the radiance within the range $(\lambda - \frac{1}{2}d\lambda)$ to $(\lambda + \frac{1}{2}d\lambda)$ to $d\lambda$, when the latter is indefinitely small (*cf.* Emissivity).

Radiation constants.—*See* Black body.

Rankine.—A name sometimes applied to the absolute Fahrenheit scale of temperature.

Réaumur.—(R). A thermometric system in which the freezing point of water is called 0° , and the boiling point, 80° .

Reflectivity.—The ratio of the intensity of the light specularly reflected from a surface to the intensity of the light incident upon it. It is a pure numeric.

Refraction.—1. The **index of refraction, refractive index, or refractive exponent** is $n = \sin i / \sin r$; i = angle of incidence from a vacuum upon the substance, and r = angle of refraction, each measured from the normal to the surface. 2. **Refractivity** is $(n - 1)$. 3. **Specific refractivity** (r_G) is $(n - 1)/d$. **Specific refraction** (r_L) is $(n^2 - 1)/d(n^2 + 2)$. d = mass per unit of volume. 4. **Molecular refractivity** = Mr_G . **Molecular refraction** = Mr_L . M = molecular weight. By replacing M by the atomic weight, the corresponding atomic values are obtained. 5. **Refractive constant** of a solute is its specific refractivity computed on the assumption that the refractivity of the solution is equal to the sum of the refractivities of its pure constituents each multiplied by the ratio of its mass per unit volume of the solution to its own density when pure.

Reluctance.—The magnetic reluctance of a body between two specified equipotential surfaces is the ratio of the difference in the two potentials divided by the flux of magnetic induction from [to] either surface to [from] the body. It has no significance unless these two fluxes are the same.

Resistance.—1. The electrical resistance of a body between two specified equipotential surfaces is E/I , where E is the unchanging difference in the potentials of the surfaces and I is the result-

ing current across any transverse section between them. 2. **Specific resistance.** See Resistivity.

Resistivity.—1. [resistance \times length]. **Resistivity**, or **volume resistivity**, of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of unit sectional area. 2. [resistance \times mass/(length)²]. **Mass resistivity** of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of such a sectional area that it contains one unit of mass per unit of length. 3. [resistance]. **Surface resistivity** is the resistance per unit of length of a strip of the surface of unit width. It has reference solely to the current which is restricted to the surface.

Rhe.—Name proposed for cgs unit of fluidity; = one reciprocal poise.

Right ascension.—See Celestial sphere.

Rigidity.—If to the four faces of a cube which are parallel to a given edge there be applied tangential stresses which are equal in absolute value, perpendicular to the given edge, and so directed as to produce a pure distortion, the other two faces will be deformed into diamond shaped figures if the material is isotropic. The modulus of rigidity is defined as the quotient of the stress on any one of the faces divided by the resulting change in any one of the angles of a distorted face. Also called **modulus of shear**, **Coulomb's modulus**, **modulus of torsion** (the last is undesirable).

Rotation.—See Rotatory power.

Rotatory power, Optical.—1. The **natural rotatory power** is θ/l , where θ is the rotation of the plane of polarization which occurs in a path of length l . The **specific rotatory power** ($[\alpha]$) is θ/dl , d = density. The **molecular** [or **atomic**] **rotatory power** is $M\theta/dl$ [or $A\theta/dl$]; M = molecular, A = atomic weight. 2. The **magnetic rotatory power** is $\theta/(lH \cos \alpha)$, where H = intensity of the magnetic field and α = angle between H and the path of the light. It is commonly called **Verdet's constant**. From the magnetic rotatory power, the specific ($[\omega]$), molecular, and atomic magnetic rotatory powers are derived exactly as in the case of natural rotation. The ratio of any one of these quantities to the corresponding one for a chosen reference substance is called the **relative power**. Water is the reference substance commonly chosen, and $[\Omega]$ is used to denote the molecular magnetic rotatory power relative to water.

Rydberg's fundamental frequency, and series constant.—See Series, spectral.

Secohm.—A superseded name for the henry.

Second.—1. (sec). **Time**, $\frac{1}{86400}$ day. Mean solar day, unless contrary is indicated. 2. ("). **Unit of angle**, $\frac{1}{3600}$ degree. 3. ("). **Centesimal second** = 0.0001 grade.

Seger cone.—One of a graded series of cones of refractory material which, by their softening and the resultant deformation, indicate the heat treatment to which they have been subjected.

Series, Spectral.—Spectral lines, or groups of lines, which occur in orderly sequence. Most of these sequences can be represented by an equation of the form $\frac{1}{\lambda} = A - \frac{BN}{(m + \alpha + \beta/m^2)^2}$; λ = wave-length in vacuo; m is an integer varying from one line (or group) to another; for any one series, A , B , N , α and β are constants; B is an integer; N is known as **Rydberg's constant**, its value is determined by the constitution of the radiating atom. On Bohr's theory, $N = N_\infty \frac{M}{M + m_e}$, where M = mass of the atom, m_e = electronic mass, and $N_\infty = 2\pi^2 m_e e^4 / h^3 c \epsilon_0^2$; N_∞ is known as **Rydberg's universal series constant**; e = electronic charge; h = Planck's constant; ϵ_0 = dielectric constant of vacuum; c = velocity of light in vacuo. On this theory, B denotes the number of electrons displaced from their normal positions, m is the **principal quantum number**, α depends

upon the subordinate, or azimuthal, quantum number, and $\beta = 0$. For atoms of the type of hydrogen, $\alpha = 0$, $\beta = 0$; for others ($m + \alpha + \beta/m^2$) is frequently called the **effective quantum number**, generally it is not an integer. **Rydberg's fundamental frequency** is $\nu_\infty = cN_\infty$.

Sidereal month.—The time required for the moon to complete one apparent circuit among the stars.

Siemens unit.—(S.E.). A superseded unit of electrical resistance proposed in 1860 by Werner von Siemens; defined as the resistance at 0°C of a column of mercury one meter long and of a uniform cross section = one mm².

Slug.—A unit of mass. 1. The mass which will acquire an acceleration of one foot per sec² when continuously acted upon by a force of one pound weight. Also called **geepound**, and **engineer's unit of mass**. 2. The **metric slug** is the mass which will acquire an acceleration of one meter per sec² when continuously acted upon by a force of one kilogram weight.

Solar month.— $\frac{1}{12}$ tropical year.

Solubility.—1. By solubility of the non-gas a in b is meant the mass of a per unit mass of b which is contained in the mixture which is in equilibrium with an excess of a . In this mixture b is said to be saturated with a . Data are frequently restricted to mass of a per unit mass of mixture, mass of a per unit volume of mixture, or moles of a per mole of mixture. 2. Solubility of a gas is C_s/C_g , C_s = concentration of gas in the solution, C_g = concentration of gas in overlying gas phase. 3. **Solubility product** of an ionized substance ($A_n B_m$) in a stated solvent = $[A]^n \cdot [B]^m$, where $[A]$ and $[B]$ denote the concentrations of the two ions when the solution is saturated with the substance.

Specific gravity.—($d_{t_1}^{t_2}$). The ratio of the mass of a certain volume of the substance at the temperature t_2 to that of the same volume of a reference substance (usually water) at temperature t_1 . Frequently, but incorrectly, called density.

Specific heat.—1. **Heat capacity.** See Capacity. 2. **Specific heat of electricity.**—See Thomson effect. 3. **Einstein's specific heat constant** (β) = ratio of Planck's constant (h) to Boltzmann's molecular gas constant (k_0). 4. **Ratio of specific heats** = $\gamma = c_p/c_v$; c_p , c_v = specific heat at constant pressure and at constant volume, respectively.

Specific inductive capacity.—The ratio of the dielectric constant of the substance to that of a vacuum.

Specific refractive power.—Used indifferently to denote several of the refractive constants (cf. Refraction).

Sperm candle, English.—A superseded unit of luminous intensity = one Int. candle.

Spheradian.—See Steradian.

Spherical candlepower, Mean.—See Mean spherical candlepower.

Square.—(sq.), (°). Used in conjunction with the name of a unit of length to form the name of a related unit of area; e.g., square foot (sq. ft.), (ft.²) is the name of a unit of area equivalent to the area of a square with edges one foot long.

Square degree.—The solid angle enclosed by a cone of vanishingly small vertex angle 2θ is $k\pi\theta^2$. If θ is expressed in radians and the unit of solid angle is so chosen that $k = 1$, that unit is called a **steradian**. If θ is expressed in degrees, and $k = 1$, the corresponding unit of solid angle is called a **square degree**. One square degree = $(\pi/180)^2$ steradians. This procedure defines a definite unit of solid angle although the solid angles enclosed in cones of finite vertex angles are not proportional to the squares of those angles.

Stefan's constant.—See Black body.

Steradian.—The solid angle which encloses on the surface of a concentric sphere an area = (radius)².

Stoichiometric.—Pertaining to the ratio of the masses of the several elements contained in a pure chemical compound.

Strain.—1. For pure distortion the strain is measured by the change in a significant angle. 2. The ratio of change in size to original size.

Stress.—The force per unit of area over which it acts.

Surface tension.—(γ). [m/l^2]. Owing to molecular attraction, two fluids in contact adjust themselves so that the area of their interface is a minimum, consistent with other requirements. This adjustment may be pictured as arising from a tension residing in the surface itself; to this is given the name **surface tension**. Its value is defined as the normal, tensile force, per unit of length, across any line traced on the surface.

Susceptibility.—(κ). In the electromagnetic systems of units, $4\pi\kappa$ is the excess of the magnetic permeability of the substance over that of a vacuum.

Synodical.—In astronomy, the synodical period of a body is the interval between its successive returns to the same position with reference to the plane which is perpendicular to the plane of the ecliptic and which continuously passes through the centers of the earth and the sun.

Synodical month.—See Lunar month.

Temperature conductivity.—See Diffusivity.

Tension, Surface.—See Surface tension.

Tenth-meter.— 10^{-10} meter; one Ångström unit.

Thermal.—See Heat.

Thermoelectric power.—See Power.

Thomson effect.—In a region in which the temperature of a homogeneous metallic conductor varies from section to section, there exists a potential gradient which is proportional to the product of the temperature and its gradient. This is the Thomson (or Kelvin) thermoelectric effect. The constant of proportionality is called the coefficient of the effect. If the coefficient is positive, a positive electric current flowing from hot section to cooler section tends to make the temperature more uniform; it is as if the current carried heat from hot portion to cooler portion, as if the electricity had a certain specific heat. This is what Thomson called the **specific heat of electricity**. It may be either positive or negative, depending upon the metal.

Time.—**True noon**, or **local true noon**, is the instant at which the sun is bisected by the meridional plane of the observer. **Mean noon**, or **local mean noon**, is the instant at which a fictitious mean sun is bisected by the meridional plane. This mean sun is one endowed with such a uniform, apparent angular velocity in the equatorial plane that in one tropical year it will make exactly the same number of apparent revolutions around the earth as are made by the true sun. Time measured from the true noon is called **true**, or **apparent**, **solar time**; that from mean noon is called **mean time**. The excess of mean time over true time is called **equation of time**. The earth has been divided into a series of time zones, each 15° of longitude in width, so that intercourse may be facilitated by all places in each zone using the mean time corresponding to the center of the zone; this is known as **standard time**. The first zone is centered on Greenwich, England.

Titer.—See Concentration.

Torque.—The moment of a force.

Tropical month.—The yearly average of the time required for the moon to traverse 360° of astronomical longitude.

Twist.—If a uniform bar of free length l be clamped rigidly at one end and the other end be twisted, about the axis of the bar, through an angle θ , the twist of the bar is defined as θ/l . Similarly for other cases.

Units, Systems of.—The fundamental units in most absolute systems are those of mass, length, time, thermometric degree, and the dielectric constant (or the magnetic permeability) of a vacuum. Other units are defined in terms of these by the use of established relations, arbitrary factors being made unity.

The most common systems are the centimeter-gram-second-degree Centigrade (cgs), and the foot-pound-second-degree Fahrenheit (fps) systems. See also International electric units, practical electric units, and absolute.

Van der Waals.—See Waals.

Vielle unit.—A superseded unit of luminous intensity based upon the brightness of fused platinum at the temperature of solidification.

Viscosity.—If a fluid is flowing in the plane yz with velocity v it exerts upon an adjacent plane a tangential drag $= \eta(dv)/(dx)$, per unit of area. η is called the **viscosity**, **coefficient of viscosity**, or **coefficient of internal friction**. Unit: poise.

Viscosity, Kinematic.—Viscosity divided by density.

Volt.—The electrical potential difference which, when steadily applied to a conductor having a resistance of one ohm, will produce in it a current of one ampere (cf. absolute and international units). The Int. Committee authorized by the London Conference, 1908, agreed to regard the emf of the Weston normal cell at 20°C as exactly 1.0183 Int. volts. This furnishes a subsidiary definition which is slightly discordant with the primary one. These tables distinguish between the two, and between units derived from them, by using (a) to denote those based on ampere and ohm, and (v) to denote those based on volt as defined by the Weston cell.

Volt-electronic charge.—Analogous to volt-faraday.

Volt-faraday.—The work which must be done in order to transfer one faraday of positive electricity from any point to another having a potential one volt higher than the former.

Volt-second.—Unit of flux of magnetic induction. The amount defined by the change per second, of the magnetic induction through an area, required to induce around the area an emf of one volt.

Volume, Specific.—Reciprocal of the density.

Waals, Van der.—In the equation $(p + a/v^2)(v - b) = 1 + \alpha t$, a and b are known as Van der Waals' constants; $a[b]$ = pressure [volume] constant.

Watt.—Unit of power; work done at rate of one joule per second.

Watt-hour.—Work expended by one watt in one hour (cf. kilowatt-hour).

Wave-length.—(λ). Distance between consecutive corresponding points in a monofrequent wave train. Occasionally applied to complex waves.

Wave number.—Reciprocal of wave-length.

Weight.—The force with which a body, left to itself, is urged towards the earth. In the absolute systems of units it is numerically equal to the mass of the body multiplied by the acceleration of gravity (g) at the position considered; hence varies with position. Such expressions as **gram weight** [pound weight] are to be interpreted as meaning the weight of a gram [a pound] at a place where g has the standard value, $980.665 \text{ cm/sec.}^2$

Wien's displacement constant.—(w). See Black body.

Year.—(yr). Time required for earth to make one complete circuit of its orbit, as defined by its return to the same position as determined by the sun and some celestial point of reference. For the **tropical**, **equinoctial**, or **ordinary year** the reference point is the mean vernal equinox; for the **sidereal**, or **true**, year, it is a fixed star; for **anomalous year**, it is perihelion of earth's orbit; for **eclipse year**, it is ascending node of moon's orbit.

Young's modulus.—If a bar of uniform section be subjected to a longitudinal tension, the ratio of this stress to the resulting elongation per unit of length is called its Young's modulus. Also called **modulus of elasticity**, **elastic modulus**, **longitudinal elasticity**, **coefficient of resistance to extension**, **modulus of traction**.

ELEMENTS AND ATOMS

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ATOMIC WEIGHTS

The values given in column four were compiled for International Critical Tables (I. C. T.) by Prof. G. P. Baxter in 1923 and are those upon which all the data given in International Critical Tables are based.

Following these are shown the accepted atomic weights back to 1882. For the period since 1903 these are taken from the reports of the International Committee on Atomic Weights; for the period 1894 to 1903, from the reports of the American Chemical Society's Committee on Atomic Weights; for the year 1882, from F. W. Clarke's "A Recalculation of the Atomic Weights," reproduced in the first (1883) edition of "Landolt-Börnstein." These 1882 values (to two decimals) are given in parentheses. A date in parentheses indicates the first appearance of the element in the atomic weight table. All the values given are based upon O = 16.000.

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
A	18	Argon	39.91	'25, 39.91; '24-'19, 39.9; '18-'11, 39.88; '10-'03, 39.9; '02, 39.96 (1902)
Ac	89	Actinium	?	
Ag	47	Silver	107.880	'25, 107.880; '24-'09, 107.88; '08-'03, 107.93; '02-'94, 107.92 (107.92)
Al	13	Aluminium	26.96	'25, 26.97; '24-'22, 27.0; '21-'00, 27.1; '99-'96, 27.11; '95-'94, 27 (27.08)
As	33	Arsenic	74.96	'25-'10, 74.96; '09-'00, 75.0; '99-'97, 75.01; '96, 75.09; '95-'94, 75.0 (75.09)
Au	79	Gold	197.2	'25-'00, 197.2; '99-'97, 197.23; '96, 197.24; '95-'94, 197.3 (196.61)
B	5	Boron	10.82	'25, 10.82; '24-'19, 10.9; '18-'00, 11.0; '99-'96, 10.95; '95-'94, 11 (10.97)
Ba	56	Barium	137.37	'25-'09, 137.37; '08-'00, 137.40; '99-'94, 137.43 (137.01)
Be	4	Beryllium	9.02	'25, 9.02; '24-'00, 9.1; '99-'96, 9.08; '95-'94, 9 (9.11)
Bi	83	Bismuth	209.00	'25-'22, 209.0; '21-'07, 208.0; '06-'03, 208.5; '02-'00, 208.1; '99-'96, 208.11; '95, 208; '94, 208.9 (208.00)
Br	35	Bromine	79.916	'25, 79.916; '24-'09, 79.92; '08-'03, 79.96; '02-'94, 79.95 (79.95)
C	6	Carbon	12.000	'25, 12.000; '24-'16, 12.005; '15-'98, 12.00; '97-'96, 12.01; '95-'94, 12 (12.00)
Ca	20	Calcium	40.07	'25-'12, 40.07; '11-'09, 40.09; '08-'00, 40.1; '99-'97, 40.07; '96, 40.08; '95-'94, 40 (40.08)
Cb	41	Columbium	93.1	'25-'17, 93.1; '16-'09, 93.5; '08-'03, 94; '02-'00, 93.7; '99-'97, 93.73; '96-'94, 94.0 (94.03)
Cd	48	Cadmium	112.41	'25, 112.41; '24-'09, 112.40; '08-'00, 112.4; '99, 112.38; '98-'97, 111.95; '96, 111.93; '95-'94, 112 (112.09)
Ce	58	Cerium	140.25	'25-'04, 140.25; '03, 140; '02-'00, 139; '99-'98, 139.35; '97-'94, 140.25 (140.75)
Cl	17	Chlorine	35.458	'25, 35.457; '24-'09, 35.46; '08-'94, 35.45 (35.45)
Co	27	Cobalt	58.97	'25, 58.94; '24-'09, 58.97; '08-'00, 59.0; '99-'98, 58.99; '97, 58.93; '96, 58.95; '95, 59.5; '94, 59 (59.02)
Cp	71	Cassiopeium	175.0	See Lu
Cr	24	Chromium	52.01	'25, 52.01; '24-'10, 52.0; '09-'00, 52.1; '99-'96, 52.14; '95-'94, 52.1 (52.13)
Cs	55	Cesium	132.81	'25-'09, 132.81; '08-'04, 132.9; '03, 133.0; '02-'00, 132.9; '00-'96, 132.89; '95-'94, 132.9 (132.92)
Ct	72	Celtium		Same as Hf
Cu	29	Copper	63.57	'25-'09, 63.57; '08-'94, 63.6 (63.32)
Ds } Dy }	66	Dysprosium	162.52	'25, 162.52; '24-'08, 162.5 (1908)
Em	86	Ra-emanation	222.	See Rn
Er	68	Erbium	167.7	'25-'12, 167.7; '11-'09, 167.4; '08-'00, 166.0; '99-'97, 166.32; '96-'94, 166.3 (166.27)
Eu	63	Europium	152.0	'25-'07, 152.0 (1907)
F	9	Fluorine	19.00	'25-'03, 19.0; '02-'00, 19.05; '99-'97, 19.06; '96, 19.03; '95-'94, 19 (19.03)
Fe	26	Iron	55.84	'25-'12, 55.84; '11-'09, 55.85; '08-'01, 55.9; '00, 56.0; '99-'96, 56.02; '95-'94, 56 (56.04)
Ga	31	Gallium	69.72	'25, 69.72; '24-'19, 70.1; '18-'09, 69.9; '08-'00, 70.0; '99-'97, 69.91; '96-'94, 69.0 (68.96)
Gd	64	Gadolinium	157.26	'25, 157.26; '24-'09, 157.3; '08-'03, 156; '02, 156.4; '01-'00, 157.0; '99-'97, 156.76; '96-'94, 156.1

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)	Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
Ge	32	Germanium	72.38	'25, 72.60; '24-'00, 72.5; '99-'97, 72.48; '96-'94, 72.3	Nd	60	Neodymium	144.27	'25, 144.27; '24-'09, 144.3; '08-'99, 143.6; '98-'97, 140.80; '96-'94, 140.5
Gl	4	Glucinium	9.02	<i>See Be</i>	Ne	10	Neon	20.2	'25-'09, 20.2; '10-'04, 20.0 (1904)
H	1	Hydrogen	1.0077	'25, 1.0077; '24-'94, 1.008 (1.00)	Ni	28	Nickel	58.69	'25, 58.69; '24-'09, 58.68; '08-'00, 58.7; '99-'96, 58.69; '95-'94, 58.7 (58.06)
He	2	Helium	4.00	'25-'16, 4.00; '15-'11, 3.99; '10-'03, 4.0; '02, 3.96 (1902)	Nt	86	Niton	222.	<i>See Rn</i>
Hf	72	Hafnium	178.6		O	8	Oxygen	16.000	'25-'94, 16.000 (16.00)
Hg	80	Mercury	200.61	'25, 200.61; '23-'12, 200.6; '11-'94, 200.0 (200.17)	Os	76	Osmium	190.8	'25, 190.8; '23-'09, 190.9; '08-'00, 191.0; '99-'96, 190.99; '95-'94, 190.8 (198.95?)
Ho	67	Holmium	163.4	'25, 163.4; '23-'13, 163.5 (1913)	P	15	Phosphorus	31.024	'25, 31.027; '24-'11, 31.04; '10-'00, 31.0; '99-'94, 31.02; '95-'94, 31 (31.03)
I (J)	53	Iodine	126.932	'25, 126.932; '24-'09, 126.92; '08-'05, 126.97; '04-'94, 126.85 (126.85)	Pa	91	Protoactinium	?	
In	49	Indium	114.8	'25-'09, 114.8; '08-'05, 115; '04-'00, 114; '99-'97, 113.85; '96-'94, 113.7 (113.66)	Pb	82	Lead	207.20	'25-'16, 207.20; '15-'09, 207.10; '08-'03, 206.9; '02-'96, 206.92; '95-'94, 206.95 (206.95)
Ir	77	Iridium	193.1	'25-'09, 193.1; '08-'03, 193.0; '02-'00, 193.1; '99-'96, 193.12; '95-'94, 193.1 (193.09)	Pd	46	Palladium	106.7	'25-'09, 106.7; '08-'03, 106.5; '02-'00, 107.0; '99-'96, 106.36; '95, 106.5; '94, 106.6 (105.98)
K	19	Potassium	39.095	'25, 39.096; '24-'09, 39.10; '08-'03, 39.15; '02-'94, 39.11 (39.11)	Po	84	Polonium	(210)	
Kr	36	Krypton	82.9	'25, 82.9; '24-'11, 82.92; '10, 83.0; '09-'03, 81.8; '02, 81.76 (1902)	Pr	59	Praseodymium	140.92	'25, 140.92; '24-'16, 140.9; '15-'09, 140.6; '08-'00, 140.5; '99-'97, 143.60; '96-'94, 143.5
La	57	Lanthanum	138.91	'25, 138.90; '24-'09, 139.0; '08-'03, 138.9; '02-'00, 138.6; '99-'97, 138.64; '96, 138.6; '95-'94, 138.2 (138.84)	Pt	78	Platinum	195.23	'25, 195.23; '24-'11, 195.2; '10-'09, 195.0; '08-'03, 194.8; '02-'00, 194.9; '99-'96, 194.89; '95-'94, 195 (194.87)
Li	3	Lithium	6.939	'25, 6.940; '24-'11, 6.94; '10-'09, 7.00; '08-'96, 7.03; '95-'94, 7.02 (7.02)	Ra	88	Radium	225.95	'25, 225.95; '24-'16, 226; '15-'09, 226.4; '08-'03, 225 (1903)
Lu	71	Lutecium	175.0	'25-'16, 175.0; '15-'09, 174.0 (1909)	Rb	37	Rubidium	85.44	'25, 85.44; '24-'09, 85.45; '08-'05, 85.5; '04-'00, 85.4; '99-'96, 85.43; '95-'94, 85.5 (85.53)
Ma	43	Masurium			Re	75	Rhenium		
Mg	12	Magnesium	24.32	'25-'09, 24.32; '08-'03, 24.36; '02-'00, 24.3; '99-'97, 24.28; '96, 24.29; '95-'94, 24.3 (24.01)	Rh	45	Rhodium	102.91	'25, 102.91; '24-'09, 102.9; '08-'00, 103.0; '99-'96, 103.01; '95-'94, 103 (104.29)
Mn	25	Manganese	54.93	'25-'09, 54.93; '08-'00, 55.0; '99-'96, 54.99; '95-'94, 55 (54.03)	Rn	86	Radon	222.	'25, 222; '24-'12, 222.4 (1912)
Mo	42	Molybdenum	96.0	'25-'00, 96.0; '99-'97, 95.99; '96, 95.98; '95-'94, 96 (95.75)	Ru	44	Ruthenium	101.7	'25-'00, 101.7; '99-'96, 101.68; '95-'94, 101.6 (104.46?)
N	7	Nitrogen	14.008	'25-'19, 14.008; '18-'07, 14.01; '06-'96, 14.04; '95, 14.05; '94, 14.03 (14.03)	S	16	Sulfur	32.065	'25, 32.065; '24-'16, 32.06; '15-'09, 32.07; '08-'03, 32.06; '02-'96, 32.07; '95-'94, 32.06 (32.06)
Na	11	Sodium	22.997	'25, 22.997; '24-'09, 23.00; '08-'94, 23.05 (23.05)	Sa	62	Samarium	150.43	'25, 150.43; '24-'09, 150.4; '08-'05, 150.3;
Nb	41	Niobium	93.1	<i>See Cb</i>					

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
Sa	62	Samarium	150.43	'04-'03, 150; '02-'00, 150.3; '99-'97, 150.26; '96-'94, 150.0
Sb	51	Antimony	121.77	'25, 121.77; '24-'03, 120.2; '02-'00, 120.4; '99-'96, 120.43; '95-'94, 120 (120.23)
Sc	21	Scandium	45.10	'25-'21, 45.10; '20-'00, 44.1; '99-'97, 44.12; '96-'94, 44.0 (44.08)
Se	34	Selenium	79.2	'25-'00, 79.2; '99, 79.17; '98-'97, 79.02; '96-'94, 79.0 (78.98)
Si	14	Silicon	28.06	'25, 28.06; '24-'22, 28.1; '21-'09, 28.3; '08-'94, 28.4 (28.26)
Sm	62	Samarium	150.43	See Sa
Sn	50	Tin	118.70	'25-'16, 118.70; '15-'00, 119.0; '99-'96, 119.05; '95-'94, 119 (117.97)
Sr	38	Strontium	87.62	'25-'11, 87.63; '10-'09, 87.62; '08-'00, 87.6; '99-'96, 87.61; '95, 87.66; '94, 87.6 (87.58)
Ta	73	Tantalum	181.5	'25-'10, 181.5; '11-'07, 181.0; '06-'03, 183; '02-'00, 182.8; '99-'97, 182.84; '96-'94, 182.6 (182.56)
Tb	65	Terbium	159.2	'25-'07, 159.2; '06-'94, 160
Te	52	Tellurium	127.5	'25-'09, 127.5; '08-'03, 127.6; '02, 127.7; '01-'00, 127.5; '99-'97, 127.49; '96, 127; '95-'94, 125 (128.252)
Th	90	Thorium	232.15	'25-'19, 232.15; '18-'11, 232.4; '10-'09, 232.42; '08-'03, 232.5; '02-'00, 232.6; '99-'96, 232.63; '95-'94, 232.6 (233.95)
Ti	22	Titanium	47.9	'25-'03, 48.1; '02-'96, 48.15; '95-'94, 48 (49.96?)
Tl	81	Thallium	204.4	'25, 204.39; '24-'09, 204.0; '08-'03, 204.1; '02-'96, 204.15; '95-'94, 204.18 (204.18)
Tm } Tu }	69	Thulium	169.4	'25, 169.4; '24-'22, 169.9; '21-'09, 168.5; '08-'03, 171; '02-'94, 170.7
U	92	Uranium	238.17	'25, 238.17; '24-'16, 238.2; '15-'03, 238.5; '02-'00, 239.6; '99-'96, 239.59; '95-'94, 239.6 (239.03)
UX, V	91 23	Uranium-X, Vanadium	(234) 50.96	Isotope of Pa '25, 50.96; '24-'12, 51.0; '11, 51.06; '10-'03, 51.2; '02-'00, 51.4; '99-'96, 51.38; '95-'94, 51.4 (51.37)

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925-1882)
W	74	Tungsten	184.0	'25-'00, 184.0; '99-'97, 184.83; '96, 184.84; '95, 184.9; '94, 184 (184.03)
Xe	54	Xenon	130.2	'25-'11, 130.2; '10, 130.7; '09-'02, 128 (1902)
Y } Yt }	39	Yttrium	89.0	'25, 88.9; '24-'19, 89.33; '18-'16, 88.7; '15-'00, 89.0; '99-'97, 89.02; '96, 88.95; '95-'94, 89.1 (90.02?)
Yb	70	Ytterbium	173.6	'25, 173.6; '24-'16, 173.5; '15-'09, 172.0; '08-'03, 173; '02-'00, 173.2; '99-'97, 173.19; '96-'94, 173.0 (173.16)
Zn	30	Zinc	65.38	'25, 65.38; '24-'10, 65.37; '09, 65.7; '08-'00, 65.4; '99-'96, 65.41; '95-'94, 65.3 (65.05)
Zr	40	Zirconium	91.	'25, 91; '24-'09, 90.6; '01-'97, 90.4; '96-'94, 90.6 (89.57)

TABLE OF ISOTOPES

F. W. ASTON

Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit.
A	18	39.91	2	40, 36	(3, 5, 21)
Ag	47	107.880	2	107, 109	(15, 26)
Al	13	26.96	1	27	(10)
As	33	74.96	1	75	(4, 22)
B	5	10.82	2	11, 10	(4, 22)
Ba	56	137.37	1	138, 136	(17, 18)
Be	4	9.02	1	9	(33)
Bi	83	209.00	1	209	(19)
Br	35	79.916	2	79, 81	(4, 22)
C	6	12.000	1	12	(2, 21)
Ca	20	40.07	2	40, 44	(31, 32)
Cd	48	112.41	6	110, 111, 112, 113, 114, 116	(19)
Ce	58	140.25	2	140, 142	(18)
Cl	17	35.458	2	35, 37	(2, 21, 23)
Co	27	58.97	1	59	(15, 26)
Cr	24	52.01	1	52	(15, 26)
Cs	55	132.81	1	133	(6, 24)
Cu	29	63.57	2	63, 65	(14, 26)
F	9	19.00	1	19	(4, 22)
Fe	26	55.84	2	56, 54	(9, 17)
Ga	31	69.72	2	69, 71	(15, 26)
Ge	32	72.38	3	74, 72, 70	(13, 26)
Gl	4	9.02	1	9	(33)
H	1	1.0077	1	1	(3, 21)
He	2	4.00	1	4	(3, 21)
Hg	80	200.61	2, 6	197-200, 202, 204	(2, 3, 21)
I	53	126.932	1	127	(5, 23)
In	49	114.8	1	115	(16)
K	19	39.095	2	39, 41	(6, 24)
Kr	36	82.9	6	84, 86, 82, 83, 80, 78	(3, 21)
La	57	138.91	1	139	(17)

Continued on p. 47.

PERIODIC CHART OF THE ELEMENTS WITH ATOMIC NUMBERS AND ATOMIC WEIGHTS

I	II	III	IV	V	VI	VII	VIII or 0	*	La ⁵⁷	Ce ⁵⁸	Pr ⁵⁹
H ¹ 1.0077							He ² 4.00	Nd ⁶⁰ 144.27	La ⁶¹ 138.91	Sa ⁶² 140.25	Eu ⁶³ 140.92
Li ³ 6.939	Be ⁴ 9.02	B ⁵ 10.82	C ⁶ 12.00	N ⁷ 14.008	O ⁸ 16.000	F ⁹ 19.00	Ne ¹⁰ 20.2	Gd ⁶⁴ 157.26	Tb ⁶⁵ 159.2	Dy ⁶⁶ 162.52	Ho ⁶⁷ 163.4
Na ¹¹ 22.997	Mg ¹² 24.32	Al ¹³ 26.96	Si ¹⁴ 28.06	P ¹⁵ 31.024	S ¹⁶ 32.065	Cl ¹⁷ 35.458	A ¹⁸ 39.91	Er ⁶⁸ 167.7	Tu ⁶⁹ 169.4	Yb ⁷⁰ 173.6	Lu ⁷¹ 175.0
K ¹⁹ 39.095	Ca ²⁰ 40.07	Sc ²¹ 45.10	Ti ²² 47.9	V ²³ 50.96	Cr ²⁴ 52.01	Mn ²⁵ 54.93		Fe ²⁶ 55.84	Co ²⁷ 58.97	Ni ²⁸ 58.69	
Cu ²⁹ 63.57	Zn ³⁰ 65.38	Ga ³¹ 69.72	Ge ³² 72.38	As ³³ 74.96	Se ³⁴ 79.2	Br ³⁵ 79.916	Kr ³⁶ 82.9				
Rb ³⁷ 85.44	Sr ³⁸ 87.62	Yt ³⁹ 89.0	Zr ⁴⁰ 91	Cb ⁴¹ 93.1	Mo ⁴² 96.0	Ma ⁴³		Ru ⁴⁴ 101.7	Rh ⁴⁵ 102.91	Pd ⁴⁶ 106.7	
Ag ⁴⁷ 107.880	Cd ⁴⁸ 112.41	In ⁴⁹ 114.8	Sn ⁵⁰ 118.70	Sb ⁵¹ 121.77	Te ⁵² 127.5	I ⁵³ 126.932	Xe ⁵⁴ 130.2				
Cs ⁵⁵ 132.81	Ba ⁵⁶ 137.37	La ⁵⁷ 138.91	Hf ⁷² (178.6)	Ta ⁷³ 181.5	W ⁷⁴ 184.0	Re ⁷⁵		Os ⁷⁶ 190.8	Ir ⁷⁷ 193.1	Pt ⁷⁸ 195.23	
Au ⁷⁹ 197.2	Hg ⁸⁰ 200.61	Tl ⁸¹ 204.4	Pb ⁸² 207.20	Bi ⁸³ 209.00	Po ⁸⁴ (210)		Rn ⁸⁶ 222	* Indicates rare earths. See above			
	Ra ⁸⁸ 225.95	Ac ⁸⁹	Th ⁹⁰ 232.15	Pa ⁹¹	U ⁹² 238.17						

α - ray \longleftarrow			THE RADIOACTIVE ELEMENTS FREDERICK SODDY							\longrightarrow β -ray (or rayless)			
Group	III	IV	V	VI	VII	VIII or 0	I	II	III	IV	V	VI	
Principal element	Tl	Pb	Bi	Po	—	Rn	—	Ra	Ac	Th	Pa	U	
Atomic number	81	82	83	84	85	86	87	88	89	90	91	92	
U-Ra Series		Ra-B Ra-C'' Ra-Ω'' Ra-D Ra-Ω'	Ra-A Ra-C' Ra-E Ra-F			Rn=Ra-Em (or Radon)		Ra		UX ₁ Io Ms-Th ₁ Ms-Th ₂		U ₁ UX ₂ U ₂	
Th Series	Th-C'' Th-B Th-C' Th-Ω' Th-Ω''	Th-A Th-C' Th-E				Th-Em Thoron		Th-X		Ra-Th			
Ac Series	Ac-C'' Ac-B Ac-C' Ac-Ω' Ac-Ω''	Ac-A Ac-E				Ac-Em Actinon		Ac-X		Ac Ra-Ac	UY Pa	U ₁ or U ₂	

TABLE OF ISOTOPES.—Continued

Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit.
Li	3	6.939	2	7, 6	(24, 27, 29, 30)
Mg	12	24.32	3	24, 25, 26	(28, 30)
Mn	25	54.93	1	55	(15, 26)
N	7	14.008	1	14	(3, 21)
Na	11	22.997	1	23	(6, 24)
Nd	60	144.27	3	142, 144, 146, 145	(17, 18)
Ne	10	20.2	2	20, 22	(1, 20, 21)
Ni	28	58.69	2	58, 60	(7)
O	8	16.000	1	16	(2, 21)
P	15	31.024	1	31	(4, 22)
Pr	59	140.92	1	141	(17)
Rb	37	85.44	2	85, 87	(6, 24)
S	16	32.065	1	32	(4, 22)
Sb	51	121.77	2	121, 123	(11, 25)
Se	21	45.10	1	45	(15, 26)
Se	34	79.2	6	80, 78, 76, 82, 77, 74	(10)
Si	14	28.06	3	28, 29, 30	(4, 18, 22)
Sn	50	118.70	7, 8	120, 118, 116, 124, 119, 117, 122, 121	(8)
Sr	38	87.62	2	88, 86	(15, 17, 26)
Te	52	127.5	3	128, 130, 126	(19)
Ti	22	47.9	1	48	(15, 26)
V	23	50.96	1	51	(15, 26)
Xe	54	130.2	7, 9	129, 132, 131, 134, 136, 128, 130, 126, 124	(3, 5, 10, 21, 23)
Yt	39	89.0	1	89	(15, 26)
Zn	30	65.38	4	64, 66, 68, 70	(31)
Zr	40	91	3	90, 94, 92	(18)

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Aston, 58, 104: 334; 19. (²) *Ibid.*, 104: 393; 19. (³) *Ibid.*, 105: 8; 20. (⁴) *Ibid.*, 105: 547; 20. (⁵) *Ibid.*, 105: 468; 20. (⁶) *Ibid.*, 107: 72; 21. (⁷) *Ibid.*, 107: 520; 21. (⁸) *Ibid.*, 109: 843; 22. (⁹) *Ibid.*, 110: 312; 22. (¹⁰) Aston, 58, 110: 664; 22. (¹¹) *Ibid.*, 110: 732; 22. (¹²) *Ibid.*, 111: 739; 23. (¹³) *Ibid.*, 111: 771; 23. (¹⁴) *Ibid.*, 112: 162; 23. (¹⁵) *Ibid.*, 112: 449; 23. (¹⁶) *Ibid.*, 113: 192; 24. (¹⁷) *Ibid.*, 113: 856; 24. (¹⁸) *Ibid.*, 114: 273; 24. (¹⁹) *Ibid.*, 114: 717; 24. (²⁰) Aston, 58, 39: 449; 20. (²¹) *Ibid.*, 39: 611; 20. (²²) *Ibid.*, 40: 628; 20. (²³) *Ibid.*, 42: 140; 21. (²⁴) *Ibid.*, 42: 436; 21. (²⁵) *Ibid.*, 45: 924; 23. (²⁶) *Ibid.*, 47: 385; 24. (²⁷) Aston and Thomson, 58, 106: 827; 21. (²⁸) Dempster, 166, 52: 559; 20. (²⁹) Dempster, 166, 53: 363; 21. (³⁰) Dempster, 2, 18: 415; 21. (³¹) *Ibid.*, 19: 431; 22. (³²) *Ibid.*, 20: 631; 22. (³³) Thomson, 3, 42: 837; 21.

THE STRUCTURE OF THE ISOLATED ATOM

(Symbols, p. 50)

H. A. KRAMERS

According to the fundamental postulates of Bohr's atomic theory, a series of discrete "stationary states" has to be correlated with each atom. A definite "energy-content" can be assigned to every state, and an atom in a given state can change its energy only by performing a process of "transition" to another state. The emission of a spectral line of frequency ν is correlated with a spontaneous transition from a stationary state of energy content E_1 to another of energy content E_2 by equation (1)

$$\nu = \frac{1}{h} (E_1 - E_2) \quad (1)$$

The stationary state with the smallest energy is termed the "normal state" of the atom. The properties of the stationary states can, to a considerable extent, be accounted for by assuming that the electrons surrounding the nucleus have definite motions, characterized by integral values of certain quantities. These integers are called the "quantum numbers" of the stationary state in question; by their values the energy of the state is completely fixed. For general treatment of the subject, see (1, 3, 4, 10, 11, 18).

Of special interest are the recent attempts (²¹) to develop a rational "quantum mechanics" of the atom. This work clearly demonstrates the limited applicability of a picture of atomic structure, in which the behavior of the electrons inside the atom is visualized by orbits possessing definite kinematical properties.

Atoms Containing One Electron.—Only for atoms containing a single electron, can a fairly complete description of the electronic motion in the stationary state, and of the significance of the quantum numbers be given. The motion of the electron obeys quite approximately the laws of electrodynamics, and can be described as a Keplerian elliptic motion, with the centre of gravity of the nucleus and the electron in one focus. On this motion, a slow uniform precession in the plane of motion is superposed (effect of variability of mass or "relativity-effect"). Two quantum numbers (n, k) define the stationary states ($n, k = 1, 2, 3 \dots; k \leq n$), k/n being the ratio of the minor to the major axis of the ellipse. The states are denoted by the symbol n_k .

In the normal state, $1_1 (n = k = 1)$, the orbit is circular; and, omitting the correction due to the relativity effect, its constants are given by equations (2)

$$a_1 = \frac{1}{Z} \cdot \frac{h^2}{4\pi^2 e^2 m_0} = \frac{r_1}{Z} = \frac{0.53}{Z} \times 10^{-8} \text{ cm}$$

$$\omega_1 = \frac{Z^2}{1 + \frac{m_0}{M}} \times \frac{4\pi^2 e^4 m_0}{h^3} = \frac{2\nu_{\infty} Z^2}{1 + \frac{m_0}{M}} = \frac{6.6 Z^2}{1 + \frac{m_0}{M}} \times 10^{15} \text{ sec}^{-1} \quad (2)$$

$$W_1 = \frac{Z^2}{1 + \frac{m_0}{M}} \times \frac{2\pi^2 e^4 m_0}{h^2} = \frac{Z^2 \nu_{\infty} h}{1 + \frac{m_0}{M}} = \frac{2.15 Z^2}{1 + \frac{m_0}{M}} \times 10^{-11} \text{ erg.}$$

In higher quantum states, the orbital constants are, with the same approximation, given by (3, 4):

$$a_n = n^2 a_1 = \frac{n^2}{Z} r_1$$

$$\omega_n = \frac{\omega_1}{n^3} = \frac{2Z^2 \nu_{\infty}}{n^3 \left(1 + \frac{m_0}{M}\right)} \quad (3)$$

$$W_n = \frac{W_1}{n^2} = \frac{Z^2 \nu_{\infty} h}{n^2 \left(1 + \frac{m_0}{M}\right)}$$

$$b_{n,k} = n k a_1 = \frac{n k r_1}{Z}; \quad p_k = k^2 a_1 = \frac{k^2 r_1}{Z} \quad (4)$$

The number of revolutions corresponding to one rotation of the major axis, is, to a first approximation, given by (5):

$$\frac{\omega_n}{\sigma_{n,k}} = \frac{k^2}{Z^2} \times \frac{2}{\alpha^2} = \frac{k^2}{Z^2} \times 37,700 \quad (5)$$

$$\left(\alpha = \frac{2\pi e^2}{hc} = 7.30 \times 10^{-3} \cong \frac{1}{137}; \alpha^2 = 5.31 \times 10^{-5} \right)$$

The exact energy formula, neglecting terms containing m_0/M , is given by (6):

$$W_{n,k} = m_0 c^2 \left[\left\{ 1 + \left(\frac{\alpha Z}{n - k + \sqrt{k^2 - \alpha^2 Z^2}} \right)^2 \right\}^{-1/2} - 1 \right] \quad (6)$$

$$= \frac{Z^2}{n^2} \times \frac{2\pi^2 e^4 m_0}{h^2} \left\{ 1 + \alpha^2 Z^2 \left(\frac{1}{kn} - \frac{3}{4n^2} \right) + \dots \right\}$$

(For general formula for W , including terms in m_0/M , see (⁹).) Figure 1 illustrates the stationary states in the hydrogen atom for which $n = 1, 2, 3, 4$. The arrows indicate the transitions giving

rise to the fine-structure components of the spectral lines, H_α and H_β . The numerical constants for these states are given in Table 1.

TABLE 1.—HYDROGEN ORBITS; $r_1 = 5.286 \times 10^{-9}$ cm ⁽¹¹⁾

n_k	a/r_1	b/r_1	p/r_1	$\omega \times 10^{-14}$	$\sigma \times 10^{-8}$	ω/σ
1 ₁	1	1	1	65.78	1746	37 700
2 ₁	4	2	1	8.222	218.3	37 700
2 ₂	4	4	4	8.222	54.57	150 700
3 ₁	9	3	1	2.436	64.68	37 700
3 ₂	9	6	4	2.436	16.17	150 700
3 ₃	9	9	9	2.436	7.187	339 300
4 ₁	16	4	1	1.029	27.29	37 700
4 ₂	16	8	4	1.029	6.822	150 800
4 ₃	16	12	9	1.029	3.032	339 300
4 ₄	16	16	16	1.029	1.705	603 200

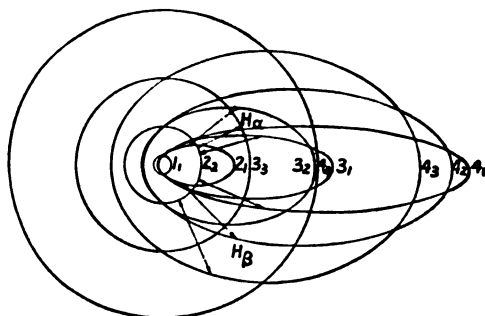


FIG. 1.—Orbits in hydrogen to $n = 4$. (Reproduced by permission from *The Journal of the Franklin Institute*.)

Atoms Containing More than One Electron.—A complete theory of stationary states is lacking. Many properties of these states can be accounted for, however, on the basis of the principles applied to atoms containing one electron. As a first approximation, each electron may be considered as moving in a central field of force due to the nucleus and the other electrons, its motion being characterized by a "principal quantum number" n and a "subordinate quantum number" k . The electronic orbit can be described as a plane periodic orbit on which a uniform precession in the plane is superposed ("central orbit" cf. Fig. 2).

If the position of the electron in the orbital plane is defined by polar coordinate (r, ϕ) , the quantum numbers are defined by Sommerfeld's quantum conditions (7)

$$k = \frac{2\pi m_0 \beta r^2}{h} \frac{d\phi}{dt} = \frac{2\pi P}{h} \quad (n - k) = \frac{1}{h} \oint m_0 \beta \left(\frac{dr}{dt} \right)^2 dt \quad (7)$$

where the factor β becomes equal to 1 if the relativity effect is neglected. P is equal to the angular momentum of the electron with respect to the nucleus; the integral has to be taken over a complete period of the radial motion, from A to B (Fig. 2).

In the normal state the electrons are distributed in groups, each of which is characterized by its quantum numbers (n, k) . On passing from the nucleus to the surface of the atom, the successive groups correspond to successive integral values of the main quantum number n (" n -quantum group"), the innermost group being characterized by $n = 1$; each group is divided into sub-groups corresponding to the different values which k may take. The possibility of reconciling such a picture with the dynamical properties of quantized central orbits is closely connected with the fact that in an orbit for which $k < n$ the electron will, in each revolution, dive into and leave again all regions occupied by

electronic orbits for which the principal quantum number is smaller than n but equal to or greater than k (conception of "penetrating orbits").

The maximum number of electrons which an n -quantum group can contain is equal to $2n^2$. If it contains this number, it contains sub-groups corresponding to all possible values for k ($k = 1, 2, \dots, n$), and it is said to be a "finally completed" group. If a group, due to the dynamical properties of the atom under consideration, contains only sub-groups corresponding to $k = 1$,

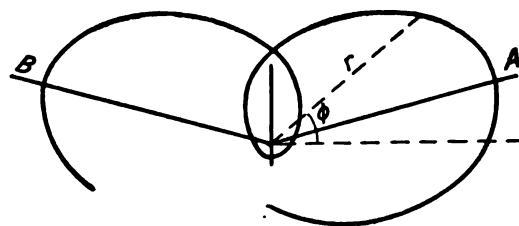


FIG. 2.—Central orbit.

$2 \dots k_0$ ($k_0 < n$) it will be in a state which is termed "provisionally completed," if it contains $2k_0^2$ electrons. For example, the 4-quantum group has reached the state of a 2-group ($k_0 = 1$) in Ca (20), the state of an 8-group or 8-shell ($k_0 = 2$) in Kr (36), the state of an 18-group or 18-shell ($k_0 = 3$) in Ag (47), and its final state of a completed 32-group or 32-shell ($k_0 = 4$) in Lu (71). With the exception of the 2-groups it seems impossible to assign definite values to the number of electrons in the several sub-groups of a provisionally, or finally, completed group; in fact, the actual properties of the electronic groups seem to show that the simple conception of central orbits characterized by the symbol n_k is essentially insufficient for their description. (Originally Bohr assumed that a group of $2k_0^2$ electrons contained $2k_0$ electrons in each sub-group.) Closely connected herewith is the impossibility of assigning definite spatial arrangements to the orbits belonging to one and the same group. In Table 2 the number of electrons in each group is given as far as the theory allows of a definite statement; those in parentheses are uncertain.

From calculations based on Sommerfeld's quantum conditions and certain simplifying assumptions, a rough estimate of the dimensions of the different types of orbits may be made. Such estimates for neutral atoms and for positive ions containing only finally, or provisionally, completed groups are schematically represented in Fig. 3. The small vertical lines are so drawn that their distances from the dot at the left are proportional to the radius of the sphere inside which the electrons belonging to the respective groups are moving. The symbols $g(n_1, 2 \dots k_0)$ means that the corresponding groups contain g electronic orbits of principal quantum number n , and of subordinate quantum numbers from 1 to k_0 .

For the calculation of the dimensions of the outermost groups it has been necessary to consider also experimental data relative to the effective gas-kinetic radii of the atoms of the inert gases, the effective radii of ions in crystals, ionic refraction, etc. As a rule the effective radii are 1.5 to 2.5 times larger than the orbital dimensions. As regards the inner groups, the estimate is rather accurate; for the outer groups, errors of the order of 10% might be expected. Special mention must be made of the uncertainty in the radius of the 5-quantum group for elements heavier than barium; the radii of this group as given in Fig. 3 for the elements (72), 79, 80, 81, 82 are perhaps some 10% too high, as compared with radii of the homologous elements 47, 48, 49, 50.

For atoms containing only one electron in the outermost group, the dimensions of the orbit of this electron, and its frequency of revolution can with considerable accuracy be derived from the

TABLE 2

	11	21 22	31 32 33	41 42 43 44	51 52 53 54 55	61 62 63 64 65 66	71 72
1 H	1						
2 He	2						
3 Li	2	1					
4 Be	2	2					
5 B	2	2 1					
6 C	2	2 (2)					
10 Ne	2	8					
11 Na	2	8	1				
12 Mg	2	8	2				
13 Al	2	8	2 1				
14 Si	2	8	2 (2)				
18 A	2	8	8				
19 K	2	8	8	1			
20 Ca	2	8	8	2			
21 Sc	2	8	8 1	(2)			
22 Ti	2	8	8 2	(2)			
29 Cu	2	8	18	1			
30 Zn	2	8	18	2			
31 Ga	2	8	18	2 1			
36 Kr	2	8	18	8			
37 Rb	2	8	18	8	1		
38 Sr	2	8	18	8	2		
39 Y	2	8	18	8 1	(2)		
40 Zr	2	8	18	8 2	(2)		
47 Ag	2	8	18	18	1		
48 Cd	2	8	18	18	2		
49 In	2	8	18	18	2 1		
54 X	8	8	18	18	8		
55 Cs	2	8	18	18	8	1	
56 Ba	2	8	18	18	8	2	
57 La	2	8	18	18	8 1	(2)	
58 Ce	2	8	18	18 1	8 1	(2)	
59 Pr	2	8	18	18 2	8 1	(2)	
71 Lu	2	8	18	32	8 1	(2)	
72 Hf	2	8	18	32	8 2	(2)	
79 Au	2	8	18	32	18	1	
80 Hg	2	8	18	32	18	2	
81 Tl	2	8	18	32	18	2 1	
86 Rn	2	8	18	32	18	8	
87 —	2	8	18	32	18	8	1
88 Ra	2	8	18	32	18	8	2
89 Ac	2	8	18	32	18	8 1	(2)
90 Th	2	8	18	32	18	8 2	(2)
118 —	2	8	18	32	32	18	8

frequency of the lowest frequency term in the corresponding spectral series, provided we may adhere to the simple central orbit model. Figure 4 contains a schematic picture of the orbits of the outer electron in the normal state of neutral atoms of the alkali metals, and of Cu, Ag, Au. They are all penetrating orbits, since they correspond to $k = 1$. The regions inside which the electrons of the completed groups are moving are designated by circles. The atoms of the inert gases are added for the sake of comparison. The numbers at the left of the nucleus indicate the number of electrons contained in each group; the symbols $n_{1,2} \dots$ at the right indicate the quantum numbers of the orbits contained in each group.

[For detailed calculations of electronic orbits, based on simplifying assumptions, see (12, 13, 20) (Cs and U); the work is semi-empirical. For detailed calculations on purely theoretical basis, see (15) (Ne, Na, Mg^+ , Al^{++} , Si^{+++} , P^{++++}) and (16) (alkali metals); in Lindsay's work, the radii of outer groups in K^+ , Rb^+ , and Cs^+ seem too large, probably on account of inadequacy of assumptions regarding numbers of electrons in sub-groups, as well as of the simplifying assumptions made. For critical review of work on effective atomic radii, see (14) and for recent work (8). There is no simple direct connection between effective atomic radii and the magnitude of the space occupied by electronic orbits.]

In experiments on optical and X-ray spectra, we meet neutral atoms or atomic ions in **higher quantum states**. Several features of these states can be described on the simple central orbit model. In the case of "single excitation" all electronic orbits except one remain normal, and the other electron describes an orbit with quantum numbers which differ from those of the normal state. "Double excitation" corresponds to two electrons describing orbits different from those in the normal state, etc. We will here consider only singly-excited states.

In the stationary states (energy levels) involved in the emission of the ordinary X-ray spectra, one electron in the inner groups of the atom is lacking. In the states involved in the emission of the ordinary series-spectra, one electron belonging to the outermost group of the atom, the "series electron," moves in a central n_k orbit the dimensions of which are large as compared with those of the rest of the atom. It may move either quite outside the atomic residue or it may penetrate into it in each revolution.

As a first approximation, a non-penetrating orbit may be described as a Keplerian elliptical orbit performing a uniform precession in its plane, the shape of the ellipse being very nearly that of an n_k -orbit in an atom containing only one electron and having a nuclear charge Z^*e equal to the net-charge of the atomic residue. If the electron orbit is of the penetrating type, it may, as a first approximation, be described as a set of congruent outer Keplerian elliptical loops, connected by congruent inner loops, the angular distance between successive loops being the same. The semi-major axis, the semi-parameter p , and the semi-minor axis b of the outer loop can be found from the value of the corresponding spectral term (T) by means of the formulae

$$a = \frac{Z^* N r_1}{T}, \quad p = \frac{k^2}{Z^*} r_1, \quad b = \sqrt{ap} \quad (8)$$

where $N \left(= \frac{\nu_\infty}{c} \times \frac{1}{1 + m_0/M} \right)$ is the Rydberg constant for the element in question, and Z^*e is the net-charge of the atomic residue. If we introduce the effective quantum number n^* ($n^{*2} = Z^{*2}N/T$), these formulae may be written:

$$a = \frac{n^{*2}}{Z^*} r_1, \quad p = \frac{k^2}{Z^*} r_1, \quad b = \frac{n^* k}{Z^*} r_1 \quad (9)$$

The greater the ratio n^*/k (or a/b) the closer the approximation to which this description of the outer loops may be considered to hold. The maximum distance of the electron from the nucleus is equal to $a + \sqrt{a^2 - b^2}$, or very nearly equal to $2a - \frac{1}{2}p$.

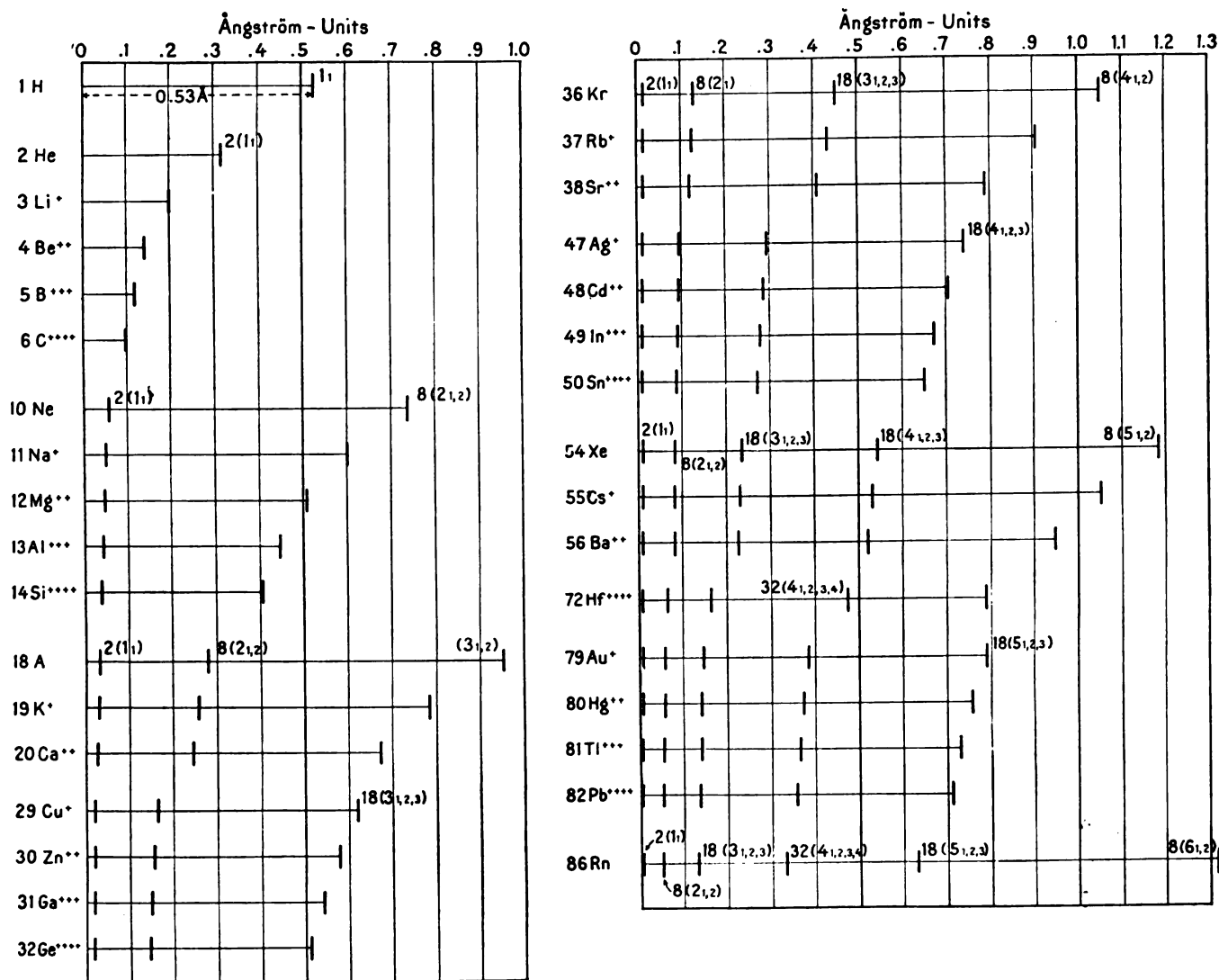


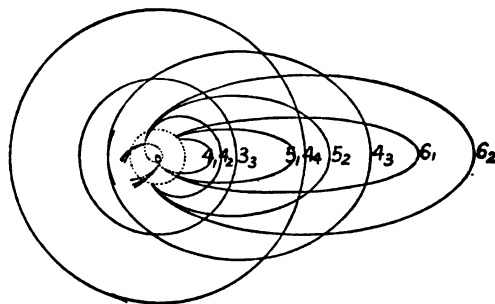
FIG. 3.—Maximum elongations of electrons of several groups.

The values to be assigned to the precessional frequency characterizing the penetrating central orbits are very uncertain. For the alkali elements, the ratio ω/σ for the n_1 orbits probably lies between 0.3 and 0.5, for the n_2 orbits (except lithium) between 0.5 and 1.0. Based on the above formulae, an illustration of the shapes of the orbits of the series electron corresponding to the stationary states of the K -atom, is given in Fig. 5. [For connection between spectra and the group structure of atoms, see (6, 5); for spectra and central field of force, see (12, 13); for series spectra and electronic orbits, see (2, 7); for recent development of formal theory of electronic groups, see (17, 19)].

SYMBOLS

The symbols c , e , h , m_0 , λ have their usual significance (see p. 16); others which occur more than once are:

- a_n Semi-major axis of electronic orbit, state n .
- $b_{n,k}$ Semi-minor axis of electronic orbit, state n, k .
- k Subordinate, or azimuthal, quantum number defining a stationary state.
- M Nuclear mass.
- n Principal quantum number defining a stationary state.

FIG. 5. —Orbits of the series electron of potassium. (Reproduced by permission from *The Journal of the Franklin Institute*.)

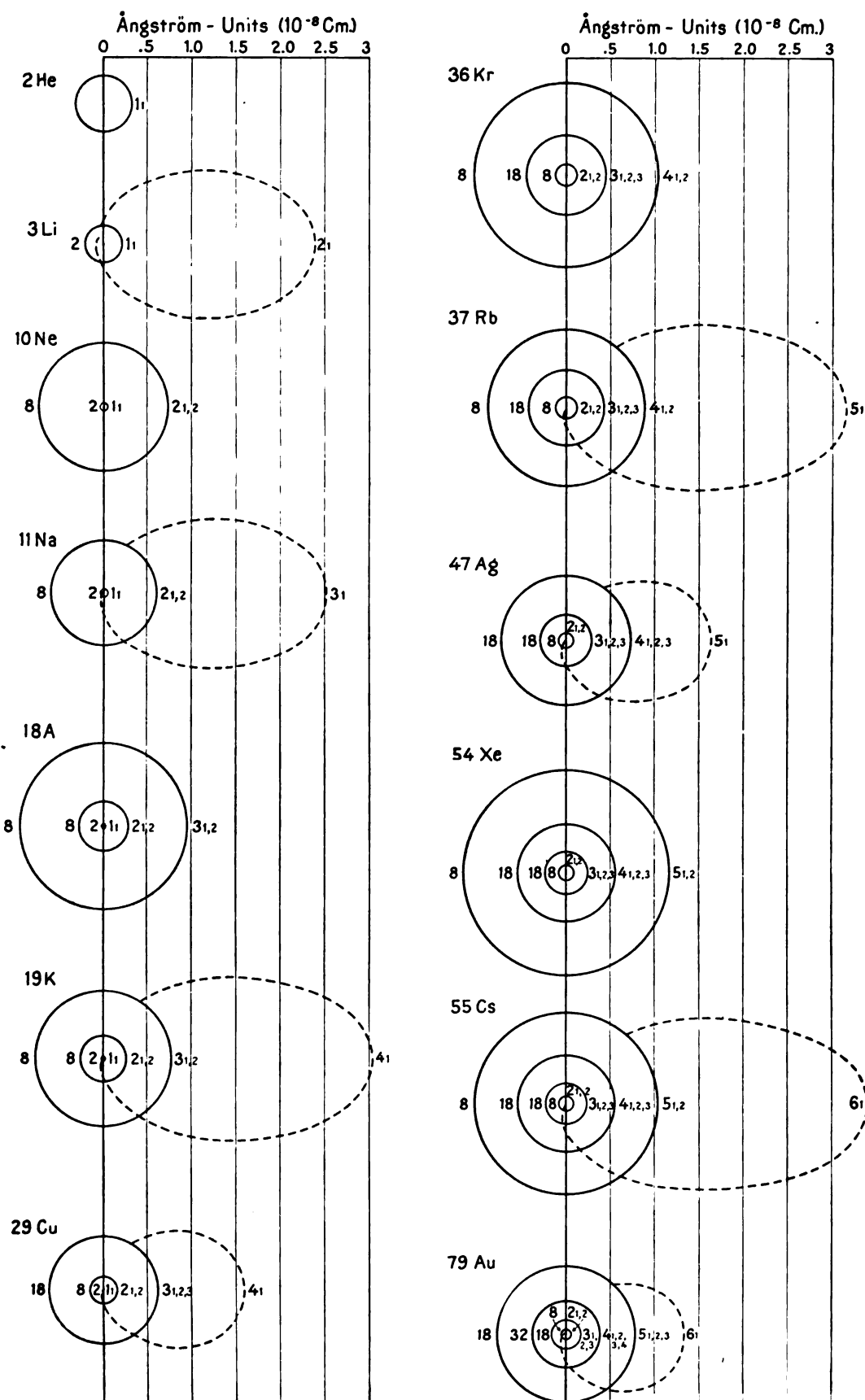


FIG. 4.—Normal orbit of outer electron.

n^*	Effective quantum number = Z^*N/T .
n_k	Designation of the state characterized by the numbers n, k .
N_∞	Rydberg constant.
p	Semi-parameter of the electronic orbit (semi-latus rectum).
r_1	Radius of first Bohr ring for hydrogen.
T	Spectral term = a wave number ($1/\lambda$) of a spectral series.
v	Speed of electron in its orbit.
W_∞	Energy expenditure required to remove the electron to infinity.
Z	Atomic number: Ze = nuclear charge.
Z^*e	Charge of atomic residue.
α	$2\pi e^2/hc$.
β	$(1 - v^2/c^2)^{-1/2}$
ν	Frequency of emitted radiation.
ν_∞	Rydberg fundamental frequency.
$\sigma_{n,k}$	Frequency of precession of electronic orbit.

ω_n Frequency of revolution of electron; for penetrating orbits, the radial frequency, one revolution being from A to B , Fig. 2.

LITERATURE

(For a key to the periodicals, see end of volume)

- (¹) Andrade, *The Structure of the Atom*, 1923. (²) Birge and Blackett, *48*, 8: 213; 24. (³) Bohr, *The Theory of Spectra and Atomic Constitution*, 2nd ed., 1924. (⁴) Bohr, *58*, 112: 29; 23. *818*, 11: 606; 23. (⁵) Bohr, *8*, 71: 228; 23. (⁶) Bohr and Coster, *96*, 12: 342; 23. (^{6a}) Born, *Vorlesungen über Atommechanik*. (⁷) Born and Heisenberg, *96*, 23: 388; 24. (⁸) Davey, *8*, 22: 211; 23. (⁹) Darwin, *8*, 39: 537; 23. (¹⁰) Foote and Mohler, *Origin of Spectra*, 1923. (¹¹) Foote, *143*, 198: 344, 517; 24. (¹²) Fuess, *96*, 11: 364; 22. *12*: 1; 22. *31*: 265; 24. *8*, 76: 299; 25. (¹³) Hartree, *801*, 21: 630; 23. *22*: 409, 464; 24. *5*, 106: 552; 24. (¹⁴) Hersfeld, *800*, 19: 259; 23. (¹⁵) Kramers and Urey, *O*. (¹⁶) Lindsay, *8*, 23: 552; 24. *285*, 3: 191; 24. *2*, 25: 239; 25. (¹⁷) Pauli, Jr., *96*, 31: 765; 25. (¹⁸) Sommerfeld, *Atombau und Spektrallinien*, 4th ed., 1925. (¹⁹) Stoner, *3*, 46: 719; 24. (²⁰) Urey, *O*. (²¹) Heisenberg, *96*, 23: 879; 25.

THERMOMETRY

E. F. MUELLER, L. H. ADAMS, F. O. FAIRCHILD AND H. T. WENSEL

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1. THERMOMETRIC SCALES

E. F. MUELLER

Centigrade or Celsius scale, °C

Fahrenheit scale, °F

Réaumur scale, °R

Centigrade absolute or Kelvin scale, °K

Fahrenheit absolute or Rankine scale, °R'

By definition or as basic values adopted for I. C. T., the ice and steam points under a pressure of $1A_n$ have the following values:

Ice point: $0^\circ\text{C} = 32^\circ\text{F} = 0^\circ\text{R} = 273.1^\circ\text{K} = 491.58^\circ\text{R}'$.

Steam point: $100^\circ\text{C} = 212^\circ\text{F} = 80^\circ\text{R} = 373.1^\circ\text{K} = 703.58^\circ\text{R}'$.

$^\circ\text{C} = \frac{5}{9} (^\circ\text{F} - 32) = \frac{5}{9} ^\circ\text{R} = ^\circ\text{K} - 273.1$.

$^\circ\text{F} = \frac{9}{5} ^\circ\text{C} + 32 = ^\circ\text{R}' - 459.58$.

2. THE STANDARD THERMODYNAMIC SCALE

E. F. MUELLER

The thermodynamic scale, which is based solely on the laws of thermodynamics and is independent of the properties of any material substance, is accepted as the standard scale of temperature. Temperatures on the thermodynamic scale are proportional to the pressures (or to the volumes) of an ideal gas in a perfect constant volume (or constant pressure) gas thermometer. The standard scale is realized in practice by use of gas thermometers, the indications of which can be reduced to the standard scale, or for higher temperatures, by use of the relations between the intensity of radiation from a black body and its temperature.

The experimental difficulties in the use of gas thermometers and the relatively low precision attainable in a single measurement have led to the introduction of a standard practical or working scale. This working scale is defined by certain base points, the temperatures of which have been determined by gas thermometer measurements, and by the indications of suitable instruments used for interpolation between the base points or for extrapolation to higher temperatures. It is possible in this way, without actually using a gas thermometer, to establish a working scale which does not differ to a demonstrable extent from the standard scale at any temperature within the range of the working scale. The practice of the various national standardizing laboratories in defining the working scale is substantially uniform at present, and it requires only minor adjustments and formal agreement to give the working scales of these laboratories the status of an international temperature scale. Such a scale would bear essentially the same relation to the standard scale, as do the international electric units to the absolute units.

The standard working scale may be defined by assigning numerical values to the temperatures defined by the boiling point of oxygen, the melting point of ice, the boiling point of water, the boiling point of sulfur, and the freezing points of antimony, silver and gold. The platinum resistance thermometer is the standard for interpolation in the range -195° to 0°C and from 0° to 650°C ; the platinum-platinum rhodium thermocouple for the range from 650° to 1063° ; and the luminous filament pyrometer above 1063°C .

Wien's law is accepted as expressing the brightness-temperature relation for a black body. For the purpose of defining the temperature scale above 1063°C the present practice of the national laboratories tends to favor the use of the value 1.430 cm degrees for the constant C_2 in this equation but the value 1.433 cm degrees has been adopted for I. C. T.

LITERATURE

(For a key to the periodicals, see end of volume)

- (¹) Reichsanstalt, *8*, 46: 1034; 15. (²) Griffiths and Schofield, *83*, 13: 222; 18. (³) Waidner, Mueller and Foote, *Pyrometry*, p. 46 (pub. by Am. Soc. Min. and Met. Engrs., 1920). (⁴) Day and Sosman, *Dictionary of Applied Physics*, 1: 836; 22. (⁵) Henning, *243*, 44: 349; 24. (⁶) Reichsanstalt, *243*, 44: 517; 24.

Reduction of Gas Thermometer Indications to the Thermodynamic Scale

The temperature t_0 on the scale of a constant volume or constant pressure gas thermometer filled with any real gas, is proportional to the pressure the gas would exert or the volume it would occupy, respectively, if all of the gas were at the uniform temperature to be measured, and if the volume or the pressure, respectively, were the same at all temperatures. At 0° and 100°C, the temperature t_0 is by definition identical with the thermodynamic temperature t , while at other temperatures t_0 departs from t by amounts which are proportional to the pressure at 0°, called the initial pressure. The tabular values are accordingly given only for an initial pressure equivalent to 1 m of mercury.

The values of $t - t_0$ obtained by various methods cover a wide range, so that only the order of magnitude of the values can be considered as known with any certainty. The tendency in modern work in gas thermometry has been to employ hydrogen or helium as the thermometric gas, and for these gases the magnitude of $t - t_0$ is comparable with the experimental error of the gas thermometer itself, so that the importance of an exact knowledge of the departure of the scales of these gas thermometers from the thermodynamic scale is correspondingly reduced.

REDUCTION OF GAS THERMOMETER INDICATIONS, t_0 , TO THE THERMODYNAMIC CENTIGRADE SCALE, t

Values of $t - t_0$ for an initial pressure of 1 meter of mercury

t °C	Helium		Hydrogen		Nitrogen	
	Const. vol.	Const. press.	Const. vol.	Const. press.	Const. vol.	Const. press.
- 250	+0.04	.....	+0.12	.....	.....	.....
- 200	+ .02	+0.04	+ .06	+0.3	+0.5	.....
- 150	+ .01	+ .02	+ .03	+ .1	+ .2	+1.3
- 100	+ .005	+ .005	+ .015	+ .04	+ .06	+ .4
- 50	+ .002	+ .002	+ .005	+ .02	+ .03	+ .12
0	.000	.000	.000	.000	.00	.00
+ 25	- .001	- .001	- .001	- .003	- .008	- .02
50	- .001	.000	- .002	- .004	- .010	- .03
75	- .001	.000	- .001	- .003	- .005	- .02
100	.000	.000	.000	.000	.000	.00
150	+ .002	+ .001	+ .01	+ .01	+ .01	+ .05
200	+ .006	+ .001	+ .02	+ .02	+ .02	+ .12
250	+ .01	+ .002	.....	+ .03	+ .04	+ .2
300	+ .02	+ .003	.....	+ .04	+ .07	+ .3
350	+ .03	+ .005	.....	.....	+ .10	+ .4
400	+ .04	+ .006	.....	.....	+ .14	+ .5
450	+ .05	+ .008	.....	.....	+ .17	+ .6
500	.....	.....	.....	.....	+ .2	+ .7
600	.....	.....	.....	.....	+ .3	+ .9
800	.....	.....	.....	.....	+ .5	+1.3
1000	.....	.....	.....	.....	+ .7	+1.8
1200	.....	.....	.....	.....	+1.0	+2.3

LITERATURE

(For a key to the periodicals see end of volume)

- (¹)Rose-Innes, *3*, 2: 131; 01. 15: 301; 08. (²)Callendar, *5*, 5: 48; 03. (³)Berthelot, *238*, 13B: 113p.; 07. (⁴)Buckingham, *31A*, 3: 237; 07. (⁵)Cath and Onnes, *168*, No. 154a; 22. 18, 6: 1; 22. (⁶)Holborn and Otto, *96*, 23: 77; 24. 30: 320; 24. (⁷)Keesom and Onnes, *B60*: 15; 24.

3. FIXED POINTS

E. F. MUELLER

t = Temperature on standard scale.

p = Pressure in millimeters of Hg (1 mm Hg = $\frac{1}{760}$ A₂) where p is between 680 and 780 mm.

BASE POINTS USED IN DEFINING THE STANDARD WORKING SCALE (I. C. T. temperature scale)

Substance	Phenomenon	Temperature, °C
Liquid O ₂	Vapor pressure	$t = \begin{cases} -183.00 + 0.245 (t + 273.1) \log_{10} p/760 \text{ or} \\ -183.00 + 0.0126 (p - 760) \\ -0.0000065 (p - 760)^2 \end{cases}$
Solid CO ₂	Vapor pressure	$t = \begin{cases} -78.51 + 0.1443 (t + 273.1) \log_{10} p/760 \text{ or} \\ -78.51 + 0.01595 (p - 760) \\ -0.000011 (p - 760)^2 \end{cases}$
Mercury*	Freezing	$t = -38.87^\circ$
Ice	Melting	$t = 0.000^\circ$
Steam	Condensing	$t = \begin{cases} 100.000 + 0.1727 (t + 273.1) \log_{10} p/760 \text{ or} \\ 100.000 + 0.0367 (p - 760) - 0.000023 (p - 760)^2 \end{cases}$
Sulfur	Condensing	$t = \begin{cases} 444.60 + 0.2215 (t + 273.1) \log_{10} p/760 \text{ or} \\ 444.60 + 0.0909 (p - 760) \\ -0.000048 (p - 760)^2 \end{cases}$
Antimony	Freezing	To be determined with resistance thermometer. $t = \text{approx. } 630.5^\circ$
Silver	Freezing	$t = 960.5^\circ$ (reducing atmosphere).
Gold	Freezing	$t = 1063^\circ$

* Not needed according to one suggested definition of the scale.

SECONDARY FIXED POINTS USEFUL IN CALIBRATING TEMPERATURE MEASURING INSTRUMENTS

(I. C. T. temperature scale)

Substance	Phenomenon	Temperature °C
Hydrogen	Boiling	$t = -252.75 + 0.0044 (p - 760)$
Nitrogen	Vapor pressure	$t = -195.80 + 0.0109 (p - 760)$
Naphthalene	Condensing	$t = 217.96 + 0.2075 (t + 273.1) \log_{10} (p/760)$
Tin	Freezing	$t = 231.85$
Benzophenone	Condensing	$t = 305.9 + 0.194 (t + 273.1) \log_{10} (p/760)$
Cadmium	Freezing	$t = 320.9$
Lead	Freezing	$t = 327.4$
Zinc	Freezing	$t = 419.45$
Aluminum (99.85 %)	Freezing	$t = 658.9$
Copper	Freezing	$t = 1083$ (reducing atmosphere)
Palladium	Freezing	$t = 1555 \pm 2$
Platinum	Melting	$t = 1755 \pm 6$
Tungsten	Melting	$t = 3370 \pm 30$

The above values are in accord with the temperature scale used throughout I. C. T. For the last three points the following slightly different values have been suggested for future adoption as secondary points on an international practical scale.

Palladium	Freezing	$t = \begin{cases} 1555 \text{ for } C_2 = 1.430 \\ 1554 \text{ for } C_2 = 1.433 \end{cases}$
Platinum	Melting	$t = \begin{cases} 1765 \text{ for } C_2 = 1.430 \\ 1763 \text{ for } C_2 = 1.433 \end{cases}$
Tungsten	Melting	$t = \begin{cases} 3400 \text{ for } C_2 = 1.430 \\ 3386 \text{ for } C_2 = 1.433 \end{cases}$

ADDITIONAL USEFUL SECONDARY POINTS

Substance	Formula	Phenomenon	Temperature, °C
Isopentane	C_5H_{12}	Freezing	-159.6
Methylcyclohexane	$C_7H_{14}CH_3$	Freezing	-126.3
Ether	$(C_2H_5)_2O$	Slow freezing (unstable)	-123.3
Ether	$(C_2H_5)_2O$	Rapid freezing or slow melting	-116.3
Carbon disulfide	CS_2	Freezing	-111.6
Toluene	C_7H_8	Freezing	-95.1
Ethyl acetate	$CH_3CO_2C_2H_5$	Freezing	-83.6
Chloroform	$CHCl_3$	Freezing	-63.5
Chlorobenzene	C_6H_5Cl	Freezing	-45.2
Carbon tetrachloride	CCl_4	Freezing	-22.9
Sodium sulfate	$Na_2SO_4 \cdot 10H_2O$	Transition	32.384
Potassium dichromate	$K_2Cr_2O_7$	Melting	397.5
30.5 NaCl + 69.5 Na_2SO_4		Melting	637.0
Potassium chloride	KCl	Melting	770.3
Sodium chloride	NaCl	Melting	800.4
Sodium sulfate	Na_2SO_4	Melting	884.7
Potassium sulfate	K_2SO_4	Inversion	583.0
Potassium sulfate	K_2SO_4	Melting	1069.1
Nickel	Ni	Melting or freezing	1452
Cobalt	Co	Melting or freezing	1490
Lithium metasilicate	Li_2SiO_3	Melting	1202
Diopside	$CaMgSi_2O_6$	Melting	1395
Anorthite	$CaAl_2Si_2O_8$	Melting	1555

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Holborn and Day, *8*, 2: 505; 00. *12*, 10: 171; 00 (Sb, Ag, Au, Cu). (2) Buckingham, *31A*, 2: 281; 07 (Review of values for S boiling point). (3) Waidner and Burgess, *31A*, 7: 1; 11 (Naphthalene, benzophenone, Sn, Cd, Zn). (4) Holborn and Henning, *8*, 38: 761; 11 (Naphthalene, benzophenone, S, Sn, Cd, Zn). (5) Day and Sosman, *168*, No. 187; 11 (Zn, Sb, Ag, Au, Cu, Pd, Pt). (6) Day and Sosman, *12*, 33: 517; 12. *8*, 38: 849; 12 (Benzophenone, Zn, Sb, S). (7) Henning, *8*, 43: 282; 14 (O, CO₂, Hg). (8) Eumorfopoulos, *6*, 90A: 189; 14 (S). (9) Wilhelm, *31A*, 13: 655; 16 (Hg). (10) Chappuis, *258*, 16: 17 (S). (11) Bureau of Standards, Cir. No. 66; 17 (Sn, Zn, Al, Cu). (12) Cath, *168*, No. 182d; 18. *64P*, 21: 656; 19 (O, N). (13) Martinez and Onnes, *168*, No. 166b; 22. *18*, 6: 31; 22 (H). (14) Worthing, *96*, 22: 9; 24 (W). (15) Henning and Heuse, *8*, 23: 104; 24 (O, N, H). (16) Flück and Wilhelm, *1*, 47: 25 (Naphthalene, benzophenone). See also References under Standard Scale of Temperature. Additional Fixed Points: Timmermans, Van der Horst and Onnes, *168*, No. 187; 22 (Organic liquids below 0°). Dickinson and Mueller, *31A*, 3: 641; 07 (Na₂SO₄ transition). Roberts, *2*, 23: 386; 24 (Salts). Day and Sosman, Dictionary of Applied Physics, 1: 836; 22 (Metals and silicates). Richards, et al, *1*, 26: 485; 14 (Na₂CO₃ hydrate transitions). 40: 89; 18 (SrCl₂ and SrBr₂ transitions). 41: 2019; 19 (C₂H₆).

THE LEIDEN TEMPERATURE SCALE

In certain sections of International Critical Tables (where so indicated) the Leiden temperature scale will be employed. (Onnes and Hoist, *168*, No. 141a. *64V*, 23: 175; 14. Cath and Onnes, *168*, No. 152a. *64V*, 26: 437, 490; 17. Cath, *168*, No. 152d. *64V*, 27: 553; 18.) The relation between the Leiden and the I. C. T. scales is shown by the following table:

Point	I. C. T.	Leiden	Leiden - I. C. T.
H ₂ (B. P.)	-252.8°	-252.74°	+0.06°
O ₂ (B. P.)	-183.0°	-182.95°	+0.05°
ca. -40°			+0.04

4. RESISTANCE THERMOMETERS

E. F. MUELLER

Standard methods of calibration have been developed only for platinum resistance thermometers. Data on the resistance-temperature relation for particular thermometers of other metals, such as gold and lead, are available, and formulae to represent the relation have been published, but standardized methods for the calibration of such thermometers have not been developed.

The standard working scale, in the interval 0° to 650°C, is defined by means of a resistance thermometer of pure platinum, for which the relation between resistance R and temperature t is given by the equation:

$$R = R_0(1 + at + bt^2). \quad (1)$$

This may be transformed into the Callendar equations:

$$(pt) = \left(\frac{R - R_0}{R_{100} - R_0} \right) 100; t - (pt) = \delta \left[\left(\frac{t}{100} - 1 \right) \frac{t}{100} \right]. \quad (2)$$

The three constants in these equations, namely R_0 , a , and b or R_0 , R_{100} and δ respectively, are determined by calibration at the ice point, the steam point, and the sulfur boiling point.

The purity of the platinum must be such that $R_{100}/R_0 > 1.390$ and $R_{144.5}/R_0 > 2.645$, the latter requirement being equivalent to $\delta < 1.50$.

The Callendar equations were devised to facilitate computations by the method of successive approximations. The platinum temperature, symbol (pt), is proportional to the resistance above R_0 and the amount by which it differs from the true temperature is given by the correction term,

$$\delta \left(\frac{t}{100} - 1 \right) \frac{t}{100}.$$

Consequently, a value of t sufficiently exact for use in computing the value of the correction term is readily obtained, if not by the first, then certainly by a second or third approximation.

In the interval -195° to 0°C the standard reference scale is defined by means of the platinum resistance thermometer, using the equation

$$t - (pt) = \delta \left[\left(\frac{t}{100} - 1 \right) \frac{t}{100} \right] + \beta \left[\left(\frac{t}{100} - 1 \right) \frac{t^2}{100^2} \right]. \quad (3)$$

The constants R_0 , R_{100} and δ are determined just as for the range above 0° and the additional constant β is determined by a calibration at the boiling point of oxygen. A criterion for the purity of the platinum is that $R_{-182.95}/R_0 < 0.250$.

Thermometers which are not to be heated above ordinary temperatures may be calibrated at the freezing point of mercury, the CO₂ point and the oxygen point, using the interpolation formula:

$$R = R_0(1 + at + bt^2 + ct^4). \quad (4)$$

The constant c in the equation is approximately equal to 5×10^{-12} and when this value is assumed, calibration at the CO₂ point may be omitted.

Equations (3) and (4) will yield substantially equivalent results, but they are not algebraically interconvertible.

Equation (1) or equation (2) may be used for temperatures up to 1000° or even 1100°C and the temperatures so determined will not depart appreciably from the standard scale.

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Callendar, *62*, 178: 160; 87. (2) Waidner and Burgess, *31A*, 6: 149; 09. (3) Holborn and Henning, *8*, 38: 761; 11. (4) Henning, *8*, 40: 635; 13 (Pt and Pb at low temperatures). (5) Henning, *8*, 43: 282; 14. (6) Cath, Onnes and Burgess, *168*, No. 182c; 17. *64P*, 20, 1163; 18 (Pt and Au at low temperatures). (7) Henning and Heuse, *96*, 23: 95; 24. (8) Van Dusen, *1*, 47: 326; 25.

5. TEMPERATURE SCALES DEFINED BY LIQUID-IN-GLASS THERMOMETERS

E. F. MUELLER

The readings of any particular thermometer, taken when all of the liquid in the thermometer is at a uniform temperature, may be reduced to those which would have been obtained if the thermometer had been perfect and used under ideal conditions, by applying corrections for non-uniformity of the capillary bore, corrections for the change of reading due to departure of the external and internal pressures from arbitrary constant values, a correction for the departure of the ice-point reading, taken immediately after the temperature measurement, from the 0° mark, and

a correction to allow for the value of the mean scale degree, in case the difference between the readings of the thermometer taken first at 100°C and then at 0°C, does not correspond to 100 scale degrees. The reading of a thermometer, when so corrected, may be defined as the temperature on the liquid-in-glass scale for the particular liquid and the particular kind of glass of which the thermometer is made.

The temperature scales of mercury thermometers made of French hard glass (verre dur), Jena 16^{III}, Jena 59^{III}, Jena 1565^{III} and Jena combustion tubing are defined as above. For Kew glass, the temperature scale is defined in a somewhat different way, in that the point of reference is the (single) ice point reading taken after the thermometer has been held for a sufficiently long period at ordinary temperature (about 10°C) instead of the (variable) ice point reading taken immediately after each temperature measurement. It is apparent that temperatures on the mercury-in-glass scale are not proportional to the relative increase of volume of mercury-in-glass.

Constants characteristic of the several glasses are the ice-point depression, the softening point, and the average coefficient of expansion of mercury-in-glass, between 0° and 100°C.

The ice point depression is the difference between the ice point reading of the thermometer taken after it has been kept a sufficiently long time (a few days or weeks) at 0° and the ice point reading taken immediately after the thermometer has been kept a sufficiently long time (a few minutes or hours) at 100°C. Good thermometric glasses are characterized by small ice point depression (less than 0.1°C) and rapid recovery. Some glasses have an ice point depression of nearly 1°C.

The softening point determines the upper limit of temperature at which thermometers made of the glass can be used.

The expansion coefficient is useful in calculating corrections for emergent stem.

Values of these characteristic constants are:

Glass	Ice point depression °C	Softening point °C	Coefficient of cubical exp. of mercury-in-glass 0° to 100°C
Verre dur.....	0.07-0.11	500	0.000158
"Kew" glass.....	0.20		
Jena 16 ^{III}	0.04-0.08	505	0.000158
Jena 59 ^{III}	0.03-0.04	510	0.000164
Jena 1565 ^{III}	0.01	660	0.000172
Jena combustion....	0.03	560	

Thermometers containing alcohol, toluene or pentane are not adapted for observation at 100°C, and for such thermometers the mean scale degree is conveniently referred to the interval 0° to -78.5°, the sublimation temperature of carbon dioxide serving to fix the latter temperature.

The tabular values are the result of comparisons of mercury-in-glass thermometers with gas thermometers or platinum resistance thermometers which served to establish the standard scale of temperature. The data for Jena 16^{III} glass and Jena 59^{III} glass may be used for Corning normal and Corning borosilicate thermometer glasses respectively.

Data of this kind were of great importance during the latter part of the 19th and even during the early part of this century, when calibrated mercury-in-glass thermometers were used to distribute the standard scale of temperature. At present the data are useful principally for minor purposes, such as calculation of factors for determining emergent stem correction, calculation of setting factors for metastatic thermometers, such as the Beckmann thermometer, graduation of thermometers by mercury thread calibration in the absence of standards and thermally controlled baths, etc.

In the tables, t represents the temperature on the standard working scale (platinum resistance thermometer) except for verre dur, where t represents temperatures on the former International hydrogen scale, which in practice is not distinguishable from the standard reference scale, while t_g represents corresponding temperatures on the several liquid-in-glass scales.

VALUES OF $t - t_g$ FOR MERCURY-IN-GLASS THERMOMETERS

t = temperature on standard scale, t_g = temperature on mercury-in-glass scale.

$t^\circ\text{C}$	French hard (verre dur)	Kew glass	Jena 16 ^{III}	Jena 59 ^{III}	Jena 1565 ^{III}	Jena combustion
-39	+0.420					
-30	+ .290		+0.28	+ 0.13		
-20	+ .172		+ .16	+ .07		
-10	+ .073		+ .07	+ .03		
0	.000	0.00	.00	.00	0.00	0.00
+10	-.052	.00	-.06	-.02	-.03	
20	-.085	.00	-.09	-.04	-.05	
30	-.102	+ .005	-.11	-.04	-.06	
40	-.107	+ .01	-.12	-.03	-.06	
50	-.103	+ .01	-.12	-.03	-.05	
60	-.090	+ .01	-.10	-.02	-.04	
70	-.072	+ .015	-.08	-.01	-.03	
80	-.050	+ .02	-.06	.00	-.02	
90	-.026	+ .025	-.03	+ .02	-.01	
100	.000	.00	.00	.00	.00	0.00
120	+ .06		+ .03	-.05	+ .06	
140	+ .07		+ .02	-.16	+ .03	
160	+ .03		-.02	-.31	-.13	
180	-.04		-.12	-.52	-.38	
200	-.12		-.29	-.84	-.90	- 1.13
220			-.5	- 1.3	- 1.3	- 1.6
240			-.9	- 1.9	- 1.8	- 2.2
260			-1.4	- 2.6	- 2.4	- 3.0
280			-2.0	- 3.4	- 3.1	- 4.0
300			-2.7	- 4.4	- 3.9	- 5.1
320				- 5.8	- 4.8	- 6.4
340				- 7.2	- 5.9	- 7.8
360				- 8.8	- 7.3	- 9.5
380				-10.6	- 8.9	-11.4
400				-12.6	-10.5	-13.5
420				-14.9	-12.4	-15.9
440				-17.4	-14.7	-18.6
460				-20.2	-17.2	-21.5
480				-23.3	-20.0	-24.8
500				-26.9	-23.1	-28.4
550					-32.	-39.
600					-44.	
650					-58.	

VALUES OF $t - t_g$ FOR LIQUID-IN-GLASS THERMOMETERS

t	Pentane in 16 ^{III} glass	Toluene in verre dur	Alcohol in verre dur
-190	-23.4		
-180	-21.0		
-170	-18.6		
-160	-16.2		
-150	-13.9		
-140	-11.6		
-130	-9.4		
-120	-7.3		
-110	-5.3		

VALUES OF $t - t_1$ FOR LIQUID-IN-GLASS THERMOMETERS.—Continued

t	Pentane in 16 ^{mm} glass	Toluene in verre dur	Alcohol in verre dur
-100	- 3.4		
- 90	- 1.7		
- 80	- 0.2	0.0	
- 78.5	0.0	0.0	0.0
- 70	+ 1.0	+ .4	+0.3
- 60	+ 2.0	+ .8	+ .6
- 50	+ 2.6	+ 1.1	+ .7
- 40	+ 3.0	+ 1.2	+ .9
- 30	+ 2.9	+ 1.2	+ .9
- 20	+ 2.4	+ 1.0	+ .8
- 10	+ 1.5	+ 0.6	+ .5
0	0.0	0.0	.0
+ 10	- 2.0		
20	- 4.4		
30	- 7.6		-3.6
100		-24.4	

LITERATURE

(For a key to the periodicals see end of volume)

Guillaume, *Traite pratique de la thermometrie*. Gauthier-Villars, Paris, 1889 (General). Chappuis, *238*, 6: 1; 88 (Verre dur -25° to 100°). Harker, *5*, 78A: 225; 06 (Kew glass). Scheel, *Deut. Mechan. Ztg.*, 1916: 170 and Holborn, Scheel and Henning, *B63* (Jena glasses and organic liquids in glass).

Emergent Stem Correction for Liquid-in-glass Thermometers

If a liquid-in-glass thermometer standardized for total immersion is used with a portion of the liquid column at a temperature below that of the bulb, the reading will be too low for this reason, and an emergent stem correction should be applied to the observed reading.

The emergent stem correction is calculated by the formula,

$$\text{Correction} = K n(t - t_1)$$

in which

K = coefficient of cubical expansion of mercury-in-glass, per °C,

t = temperature of bulb, °C,

t_1 = average temperature °C of the mercury column n °C degrees in length.

The value of t is to be determined by means of an auxiliary thermometer or thermometers, preferably with a capillary thermometer. The sign as well as the magnitude of the correction is given by the formula.

For many purposes, in using mercury-in-glass thermometers K may be treated as a constant of the glass, using the values given above for the apparent coefficient of expansion of mercury-in-glass. The value of K does, however, change with temperature. For purposes of computing the emergent stem correction, it may be considered as depending on the average of t and t_1 , that is $\frac{t + t_1}{2}$ and is here so tabulated.

If the coefficients of expansion of mercury and of glass were both constant, K would also be constant. Most of the change in K is the result of the varying coefficient of the mercury, so that the change in K with temperature for one glass may with some certainty be inferred from the change for some other glass.

The use of the formula requires that t , the temperature of the bulb, be known. In case t is not known, but is to be determined from the indication of the thermometer, the reading of the thermometer may be substituted in the formula in place of t , as a first approximation and the true magnitude of the correction then calculated by means of a second, or if necessary, a third approximation.

In many cases, in calculating the emergent stem correction for thermometers containing organic liquids, it is sufficient to use the approximate value, $K = 0.001$. The tables show to what extent this is justified for pentane, toluene, and alcohol. In such thermometers, K is practically independent of the kind of glass used.

With the abandonment of the mercury-in-glass thermometer as an instrument of high precision there has been an increasing tendency to use partial immersion thermometers, graduated and standardized for a particular depth of immersion, thus avoiding the necessity of determining and applying the correction for emergent stem.

TABLE OF EMERGENT STEM CORRECTION FACTORS
Mercury-in-glass Thermometers

$\frac{t + t_1}{2}$ °C	Verre dur	Jena 16 ^{mm}	Jena 59 ^{mm}	Jena 1565 ^{mm}	Jena combustion
50	0.000158	0.000158	0.000164	0.000172	0.000164
100	158	158	164	172	164
150	158	158	165	173	165
200	159	159	167	175	167
250		161	170	177	171
300		164	174	180	174
350			177	184	178
400			182	188	182
450			187	194	188
500			195	200	195

Liquid-in-glass Thermometers

$\frac{t + t_1}{2}$	Pentane	Toluene	Alcohol
-180	0.0009		
-160	09		
-140	09		
-120	10		
-100	10		
- 80	10	0.0009	0.0010
- 60	11	09	10
- 40	12	10	10
- 20	13	10	10
0	14	10	10
+ 20	15	11	10

LITERATURE

(For a key to the periodicals see end of volume)

Buckingham, *31a*, 8: 239; 12.

Example: A thermometer of Jena 59^{mm} (or Corning borosilicate glass) indicated a temperature, t , of 470° after application of corrections peculiar to the instrument. The thermometer was immersed to the 150° mark, and the *average* temperature t_1 of the 320° (n °) of exposed mercury column was found to be 190°. The average of t and t_1 is 330° and the value of the factor K for this temperature is 0.000176. Accordingly

$$\text{Correction} = 0.000176(320)(470 - 190) = 15.8^\circ$$

The corrected temperature is therefore 470° + 15.8° = 485.8°. Since the bulb temperature was considerably higher than 470° a second approximation may be tried:

$$\text{Correction} = 0.000176(320)(486 - 190) = 16.7^\circ$$

The second approximation yields a corrected temperature of 470° + 16.7° = 486.7° which in view of the rather large emergent stem correction, may properly be reported as 487°.

Possible short cuts in making the second approximation will be readily apparent.

The example given is purposely somewhat exaggerated by assuming an unusually high temperature (190°) for the emergent

stem, in order to show that the factor K may differ appreciably from the conventional value of 0.00016.

For computations in Fahrenheit temperatures, the proper value of K is $\frac{5}{9}$ of the tabulated value.

6. THERMOCOUPLES

L. H. ADAMS

"Standard" Calibration Tables (for Use with Deviation Curve)

Standard tables such as these do not necessarily have any absolute significance; primarily, they are arbitrary reference curves which, although representing fairly well the temperature-emf functions for certain thermocouples, are intended for use with an appropriate deviation-curve. This correction-curve is determined for each couple by calibration at several—preferably

three or more—fixed points within the "applicability range of the couple." This curve is constructed by plotting ΔE as ordinate ($\Delta E = E_{\text{obs.}} - E_{\text{stand.}}$) against $E_{\text{stand.}}$ as abscissa. In order to obtain the temperature corresponding to the emf indicated by the couple, the appropriate value of ΔE (as obtained from its deviation curve) is subtracted algebraically from the observed value of E before the latter is converted into degrees by means of the table. Example: At a certain temperature a copper-constantan couple gave an emf of 8720 microvolts. From the previously determined deviation curve of the particular couple the value of ΔE at 8720 microvolts is found to be 12 microvolts. The "standard" emf is therefore 8720 - 12 or 8708 microvolts and from the copper-constantan table this may be seen to correspond to 189.08°, which is the required temperature.

The fixed (i.e., cold) junction is supposed to be maintained at 0°C.

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 100 MICROVOLTS
Platinum: Platinrhodium (90-10). Standard range, 630°-1083°C. Applicability range, 0-1754°C

E μV	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	E μV
0	0	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4		0
100	17.8	159.7	276.6	384.9	488.3	588.1	684.8	778.8	870.1	959.2		100
200	34.5	172.1	287.7	395.4	498.4	597.9	694.3	788.0	879.1	968.0		200
300	50.3	184.3	298.7	405.9	508.5	607.7	703.8	797.2	888.1	976.7		300
400	65.4	196.3	309.7	416.3	518.6	617.4	713.3	806.4	897.1	985.4		400
500	80.0	208.1	320.6	426.7	528.6	627.1	722.7	815.6	906.1	994.1		500
600	94.1	219.7	331.5	437.1	538.6	636.8	732.1	824.7	915.0	1002.8		600
700	107.8	231.2	342.3	447.4	548.6	646.5	741.5	833.8	923.9	1011.5		700
800	121.2	242.7	353.0	457.7	558.5	656.1	750.9	842.9	932.8	1020.1		800
900	134.3	254.1	363.7	467.9	568.4	665.7	760.2	852.0	941.6	1028.7		900
1000	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4	1037.3		1000

E μV	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	E μV
0	1037.3	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3	0
100	1045.9	1130.6	1214.2	1297.7	1380.7	1463.0	1545.8	1629.2	1712.6	100
200	1054.4	1139.0	1222.6	1306.0	1389.0	1471.2	1554.1	1637.6	1721.0	200
300	1062.9	1147.4	1230.9	1314.3	1397.3	1479.4	1562.4	1645.9	1729.3	300
400	1071.4	1155.8	1239.3	1322.6	1405.6	1487.7	1570.8	1654.3	1737.7	400
500	1079.9	1164.2	1247.6	1330.9	1413.8	1496.0	1579.1	1662.6	1746.0	500
600	1088.4	1172.5	1255.9	1339.2	1422.0	1504.3	1587.5	1670.9	1754.3	600
700	1096.9	1180.9	1264.3	1347.5	1430.2	1512.6	1595.8	1679.3	1762.7	700
800	1105.4	1189.2	1272.6	1355.8	1438.4	1520.9	1604.2	1687.6	1771.0	800
900	1113.8	1197.6	1281.0	1364.1	1446.6	1529.2	1612.5	1696.0	1779.4	900
1000	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3	1787.7	1000

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 100 MICROVOLTS
Copper: Constantan

Σ mV	-5000	-4000	-3000	-2000	-1000	0	1000	2000	3000	4000	5000	6000
0	-169.14 6.80	-124.46 4.01	-87.86 3.48	-55.81 3.05	-26.82 2.79	0 2.60	25.27 2.45	49.20 2.33	72.08 2.23	94.07 2.16	115.31 2.09	135.91 2.03
100	-174.34 6.40	-128.47 4.09	-91.28 3.46	-58.86 3.08	-29.61 2.81	2.59 2.62	27.72 2.43	51.53 2.32	74.31 2.23	96.23 2.15	117.40 2.08	137.94 2.02
200	-179.74 6.64	-132.56 4.18	-94.74 3.61	-61.94 3.11	-32.42 2.84	5.16 2.63	30.15 2.48	53.85 2.31	76.54 2.22	98.38 2.14	119.48 2.08	139.96 2.02
300	-185.38 6.89	-136.74 4.28	-98.25 3.67	-65.05 3.15	-35.26 2.86	7.72 2.65	32.57 2.41	56.16 2.30	78.76 2.21	100.52 2.14	121.56 2.07	141.98 2.01
400	-191.27 6.17	-141.02 4.39	-101.82 3.63	-68.20 3.19	-38.12 2.87	10.27 2.65	34.98 2.40	58.46 2.30	80.97 2.20	102.66 2.13	123.63 2.06	143.99 2.01
500	-197.44 6.51	-145.41 4.50	-105.45 3.68	-71.39 3.22	-41.01 2.90	12.80 2.68	37.38 2.39	60.76 2.28	83.17 2.20	104.79 2.12	125.69 2.06	146.00 2.00
600	-203.95 6.97	-149.91 4.61	-109.13 3.74	-74.61 3.26	-43.91 2.93	15.32 2.61	39.77 2.38	63.04 2.27	85.37 2.19	106.91 2.11	127.75 2.06	148.00 2.00
700	-210.92 7.65	-154.52 4.75	-112.87 3.90	-77.87 3.29	-46.84 2.96	17.83 2.49	42.15 2.36	65.31 2.27	87.56 2.18	109.02 2.10	129.80 2.04	150.00 1.99
800	-218.47 8.00	-159.25 4.87	-116.67 3.86	-81.16 3.33	-49.80 2.99	20.32 2.48	44.51 2.35	67.58 2.25	89.74 2.17	111.12 2.10	131.84 2.04	151.99 1.99
900	-224.47 8.08	-164.12 5.08	-120.53 3.93	-84.49 3.37	-52.79 3.08	22.80 2.47	46.86 2.34	69.83 2.25	91.91 2.16	113.22 2.09	133.88 2.03	153.97 1.98
1000	-229.47 8.14	-169.14 5.14	-124.46 4.00	-87.86 3.43	-55.81 3.14	25.27 2.47	49.20 2.34	72.08 2.25	94.07 2.16	115.31 2.09	135.91 2.03	155.95 1.98

Σ mV	7000	8000	9000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000
0	155.95 1.97	175.50 1.83	194.62 1.89	213.36 1.85	231.74 1.82	249.82 1.79	267.60 1.76	285.13 1.74	302.42 1.72	319.49 1.70	336.36 1.68	353.08 1.66	369.61 1.64
100	157.92 1.97	177.43 1.83	196.51 1.89	215.21 1.85	233.56 1.82	251.61 1.79	269.36 1.76	286.87 1.74	304.14 1.71	321.10 1.69	338.04 1.68	354.74 1.66	371.25 1.64
200	159.89 1.97	179.36 1.83	198.40 1.89	217.06 1.85	235.38 1.82	253.40 1.79	271.12 1.76	288.61 1.74	305.85 1.71	322.88 1.69	339.72 1.68	356.40 1.66	372.89 1.64
300	161.86 1.96	181.28 1.83	200.28 1.88	218.91 1.84	237.20 1.81	255.18 1.78	272.88 1.76	290.35 1.73	307.56 1.71	324.57 1.69	341.40 1.67	358.06 1.66	374.53 1.64
400	163.82 1.96	183.20 1.83	202.16 1.88	220.75 1.84	239.01 1.81	256.96 1.78	274.64 1.76	292.08 1.73	309.27 1.71	326.26 1.69	343.07 1.67	359.72 1.66	376.17 1.64
500	165.78 1.95	185.11 1.83	204.04 1.87	222.59 1.84	240.82 1.81	258.74 1.78	276.40 1.76	293.81 1.73	310.98 1.71	327.95 1.69	344.74 1.67	361.37 1.66	377.80 1.64
600	167.73 1.95	187.02 1.83	205.91 1.87	224.43 1.84	242.63 1.81	260.52 1.78	278.15 1.76	295.54 1.73	312.69 1.71	329.64 1.69	346.41 1.67	363.02 1.66	379.43 1.64
700	169.68 1.94	188.93 1.83	207.78 1.87	226.26 1.85	244.43 1.80	262.29 1.77	279.90 1.76	297.26 1.73	314.39 1.70	331.32 1.68	348.08 1.67	364.67 1.66	381.06 1.64
800	171.62 1.94	190.83 1.83	209.64 1.88	228.09 1.85	246.23 1.80	264.06 1.77	281.65 1.76	298.98 1.73	316.09 1.70	333.00 1.68	349.75 1.67	366.32 1.66	382.69 1.64
900	173.56 1.94	192.73 1.83	211.50 1.88	229.92 1.85	248.03 1.80	265.83 1.77	283.39 1.76	300.70 1.73	317.79 1.70	334.68 1.68	351.42 1.67	367.97 1.66	384.32 1.64
1000	175.50 1.94	194.62 1.83	213.36 1.88	231.74 1.85	249.82 1.80	267.60 1.77	285.13 1.76	302.42 1.73	319.49 1.70	336.36 1.68	353.08 1.66	369.61 1.64	385.95 1.63

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 0.5 MILLIVOLT

Chromel-alumel					
E mv	0	10	20	30	40
0	0.0	244.5	482.8	719.2	970.4
	12.3	12.2	11.7	12.2	13.0
0.5	12.3	256.7	494.5	731.4	983.4
	12.1	12.2	11.7	12.3	13.1
1.0	24.4	268.9	506.2	743.7	996.5
	12.0	12.1	11.7	12.3	13.2
1.5	36.4	281.0	517.9	756.0	1009.7
	12.0	12.1	11.7	12.3	13.3
2.0	48.4	293.1	529.6	768.3	1023.0
	12.0	12.0	11.7	12.4	13.3
2.5	60.4	305.1	541.3	780.7	1036.3
	12.0	12.0	11.7	12.4	13.4
3.0	72.4	317.1	553.0	793.1	1049.7
	12.0	12.0	11.7	12.5	13.5
3.5	84.4	329.1	564.7	805.6	1063.2
	12.0	11.9	11.7	12.5	13.6
4.0	96.4	341.0	576.4	818.1	1076.8
	12.1	11.9	11.8	12.5	13.7
4.5	108.5	352.9	588.2	830.6	1090.5
	12.1	11.9	11.8	12.6	13.7
5.0	120.6	364.9	600.0	843.2	1104.2
	12.2	11.9	11.8	12.6	13.8
5.5	132.8	376.8	611.8	855.8	1118.0
	12.4	11.9	11.8	12.6	13.8
6.0	145.2	388.6	623.6	868.4	1131.8
	12.5	11.8	11.8	12.6	13.9
6.5	157.7	400.4	635.4	881.0	1145.7
	12.6	11.8	11.8	12.7	13.9
7.0	170.2	412.2	647.2	893.7	1159.6
	12.5	11.8	11.9	12.7	14.
7.5	182.7	424.0	659.1	906.4	(1174.)
	12.5	11.8	11.9	12.7	14.
8.0	195.2	435.8	671.0	919.1	(1188.)
	12.4	11.8	12.0	12.8	14.
8.5	207.7	447.6	683.0	931.9	(1202.)
	12.3	11.8	12.0	12.8	
9.0	220.0	459.4	695.0	944.7	
	12.3	11.7	12.1	12.8	
9.5	232.3	471.1	707.1	957.5	
	12.2	11.7	12.1	12.9	
10.0	244.5	482.8	719.2	970.4	

Fixed-junction Corrections

If the fixed or "cold" junction be not maintained at 0°C, a correction must be applied. This may be done by any one of several methods, of which the following are suggested:

A. Let the temperature of the fixed junction be t_c and that of the variable or "hot" junction be t . Then to the emf as read E_{t-t_c} , add the emf corresponding to t_c . This gives E_t which may at once be converted into degrees by means of the proper table.

B. Multiply the fixed-junction temperature by the factor, $f = (dE/dt)_0 / (dE/dt)$, which is the ratio of the mean emf-temperature gradient between 0° and t_c to the gradient at t , and add the product to t' , the uncorrected temperature. That is, $t = t' + ft_c$. These emf-temperature gradients may be obtained by taking the reciprocals of the numbers appearing in the difference columns of the calibration tables.

COMPARISON OF THE MORE COMMON THERMOCOUPLES

E mv	Temperature, °C				E mv	Temperature, °C		
	Iron: constantan	Chromel (X): copel	Chromel (P): alumel	Platinrhodium: gold-palladium		Platinum: platinrhodium (Heraeus)	Platinum: Platinrhodium (Johnston-Matthey)	Copper: constantan
0	0	0	0	0	0	0	0	0
5	95	105	121	131	1	147	146	25
10	186	195	244	237	2	265	260	49
15	277	277	365	335	3	374	364	72
20	367	353	483	429	4	478	461	94
25	457	425	600	513	5	578	553	115
30	546	495	719	607	6	675	641	136
35	632		843	694	7	769	725	156
40	713		970	779	8	861	806	176
45	792		1104	866	9	950	884	195
50	871			954	10	1037	959	213
55	950			1044	11	1122	1032	232
60				1136	12	1206	1103	250
					13	1289	1173	268
					14	1372	1242	285
					15	1455	1311	302
					16	1537	1379	320
					17	1620	1447	336
					18	1704	1515	353

* 10 % Rh; 40 % Pd.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Adams, 128, 3: 469; 13. 1, 36: 65; 14. 355, 1919: 2111. (²) Adams, O. (³) Adams and Johnston, 13, 32: 534; 12. (⁴) Foote, Fairchild and Harrison, 32, No. 170: 21. (⁵) Hoskins Mfg. Co., Catalog D: 24. (⁶) Roberts, O. (⁷) Soeman, 12, 30: 7; 10.

OPTICAL PYROMETRY

C. O. FAIRCHILD AND H. T. WENSEL

The temperature scale above the melting point of gold is based

upon Wien's Law, $J_\lambda = c_1 \lambda^{-5} e^{-\frac{C_2}{\lambda T}}$, in which the constant C_2 (1.433 cm deg) and the value 1336°K for the melting point of gold determine the scale. In optical pyrometry temperatures are usually measured by comparing the brightness of a glowing object with that of the filament of a lamp mounted in the image plane of a simple telescope. For highest accuracy the current through the lamp is kept at or near the value corresponding to 1336°K and higher temperatures are measured by reducing the brightness of the image of the object to match that of the filament by means of a suitable screen such as a rotating sector or an absorption glass of known transmission. The temperature is then found from the following formula derived from Wien's Law:

$$\frac{1}{T} = \frac{1}{1336} + \lambda_0 \frac{\log_{10} R}{6222},$$

in which R is the transmission of the absorption device and λ_0 is the "mean effective wave-length" of a color filter in the pyrometer for the temperature interval 1336° to T . Values of λ_0 can be obtained in some cases by the use of Table 2.

For practical purposes the pyrometer is ordinarily calibrated in the range 700° to 1400°C (occasionally to 1550°C) in terms of filament current. A satisfactory empirical relation between the current I through the lamp filament and temperature t °C is:

$I = a + bt + ct^2 + dt^3$. For tungsten lamps with short 3 mil filaments dI/dt varies from about 0.00015 ampere per degree at 700°C ($I = 0.3$) to 0.0003 ampere per degree at 1400° ($I = 0.5$). For measurements above 1400° an absorption glass of such type is employed that $A(= \lambda_e \log_{10} R/6223)$ is a constant or varies slightly with temperature. If the spectral transmission, Tr , of the

absorption device is of the form $Tr_\lambda = e^{-\frac{K}{\lambda}}$, A will be a constant and equal to K/c_2 . For sector discs $A = \text{constant} \cdot \lambda_e$.

TABLE I

Temperatures extrapolated from 1336°K, using Wien's Law, compared with those obtained using Planck's Law. The values in this table were computed from the relation:

$$T_p = \frac{C_2}{\lambda \log_e \left[1 + e^{\frac{C_2}{\lambda T_w}} \right]}$$

taking $\lambda = 0.65\mu$.

T_w	T_p	$T_w - T_p$	T_w	T_p	$T_w - T_p$
1336	1336.000	.....	4500	4493	7
2000	1999.997	0.003	5000	4986	14
2500	2499.958	.042	6000	5959	41
3000	2999.74	.26	8000	7825	175
3500	3499.0	1.0	10 000	9550	450
4000	3997	3	∞	31 800	∞

TABLE 2

Effective wave-length and mean effective wave-length of optical pyrometer red glass filters. The effective wave-length λ_T is found from the formula

$$\frac{1}{\lambda_T} = a - \frac{b}{T}$$

Equation*	Corning H. T. red glasses				Visibility
	A	B	C	D	
a	1.5509	1.5415	1.5369	1.5319	
b	29.6	28.2	28.0	26.8	
Wave-length microns	Transmission				
0.615	0.000	0.000	0.000	0.000	0.442
.625	.085	.007	.000	.000	.323
.635	.520	.270	.141	.080	.220
.645	.730	.533	.389	.350	.141
.655	.798	.637	.508	.520	.084
.665	.815	.664	.541	.580	.046
.675	.823	.677	.557	.605	.024
.685	.828	.686	.567	.605	.0126
.695	.830	.689	.572	.603	.0061
.705	.830	.689	.572	.598	.0031
.715	.826	.682	.564	.590	.00158
.725	.824	.679	.559	.580	.00078
.735	.822	.676	.555	.572	.00038
.745	.820	.672	.551	.567	.00018
.755	.818	.669	.547	.550	.00009
.765	.815	.664	.541	.535	.00003
.775	.813	.661	.537	.510	.00000

* The constants a and b are given for four typical red glasses of the transmissions indicated. The change in effective wave-length with temperature of glass filter itself is closely 0.00009 μ per deg C at ordinary room temperatures.

Angular apertures required in the telescope of the disappearing filament type of optical pyrometer for a balance between reflection and diffraction at the filament. Under such conditions disappearance of the filament is obtained without resorting to low magnification or very low resolving power.

TABLE 3.—TUNGSTEN FILAMENT OF CIRCULAR CROSS-SECTION

Exit aperture radians	Entrance aperture, radians	
	Filament diameter 0.04 to 0.06 mm	Filament diameter 0.1 mm
0.005	very low resolving power	
.01	0.04 and larger	0.04 and larger
.02	.06 to .16	.055 to .07
.04	.08 to .13	
.06	non-disappearance	

TABLE 4.—BRIGHTNESS TEMPERATURE VERSUS TRUE TEMPERATURE FOR RED LIGHT ($\gamma = 0.65\mu$)

Observed brightness temperature	True temperature						
	Platinum ⁽¹⁾	Iron ⁽²⁾	Iron oxide ⁽³⁾	Nickel oxide ⁽⁴⁾	Copper ⁽⁵⁾	Copper oxide ⁽⁵⁾	Nichrome or chromel ⁽⁶⁾
700	745		700	701			702
800	857		801	802			804
900	972		902	904		903	906
950					1083	958	
975					1181		
1000	1090		1004	1007	1156	1020	1010
1025					1193		
1050					1231	1087	
1100	1210	1183	1106	1110		1159	1116
1150						1233	
1200	1332	1296	1210	1215			1224
1300	1455	1410		1320			
1400		1525					
1500		1641					
1600		1758					
1700		1877					
1750		1936					

LITERATURE

(For a key to periodical see-end of volume)

- (¹) Waidner and Burgess, *SIa*, 3: 163; 07. (²) Computed for an emissivity of 0.4; cf. Burgess, *SI*, No. 91: 17. (³) Burgess and Foote, *SIa*, 12: 83; 15. (⁴) Burgess and Foote, *SIa*, 11: 41; 15. (⁵) Burgess, *SIa*, 5: 111; 09. (⁶) Foote, Bureau of Standards, *O*. For data on C, Ta, W and other substances see sections on emissivity, color temperature, etc.

GENERAL REFERENCES

Burgess and Le Chatelier, *Measurement of High Temperature*, 1912. Pyrometry: Symposium of American Institute of Mining and Metallurgical Engineers, 1919. Foote, Fairchild and Harrison, *SI*, No. 170: 21. Foote, Mohler and Fairchild, *IS*, 7: 18; 17. Foote, *SI*, 12: 3; 18. Forsythe, *SI*, 15: 3; 20. Fairchild and Hoover, *IS*, 7: 7; 23.

LABORATORY METHODS FOR PRODUCING AND MAINTAINING CONSTANT TEMPERATURE

C. W. KANOLT, OLAF A. HOUGEN, ROLAND A. RAGATZ AND W. E. FORSYTHE

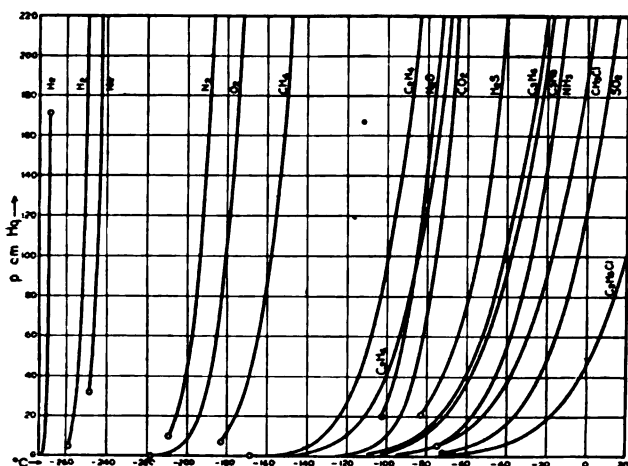
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The successful application of the methods described in this section involves careful attention to the details of construction and operation of the auxiliary apparatus. For these details the reader is referred to the original literature.

1. TEMPERATURES BELOW 0°C

C. W. KANOLT

(a) *Bath Liquids Boiling at Constant Pressure.*—The temperature-pressure data for a number of suitable liquids are displayed graphically in Fig. 1. For further data concerning these liquids consult the index of I. C. T. Solid CO₂ mixed with a suitable low-freezing liquid may also be used. Cf. Sec. (b) *infra*, also (42).



Bath liquids for the maintenance of constant temperatures by boiling at a constant pressure.

(b) *Bath Liquids with Thermostatic Control.*—In some cases the liquid-solid mixture with proper thermal insulation may be conveniently used to automatically maintain the temperature of the invariant point (M.P. or eutectic). For general discussion of low temperature baths v. (16). The systems given below are arranged approximately in ascending order of their minimum working temperatures.

Abbreviations and Signs.—B. = "boils;" Cor. = "corrosiveness" or "corrosive;" E. = "eutectic composition;" Fl. = "flammable," hazardous, especially if cooled by means of liquid air. S. = "solidifies" or "solidification;" SS. = "suggested for use at its solidifying temperature;" η = "viscosity;" + = "high," - = "moderate or low," thus, η - = "moderate or low viscosity."

Below -150°.—1. *Petroleum distillate*, d_4^{15} 0.647: S. < -190° (3). *Ibid.*, d_4^{17} = 0.651: S. < -190°. B. 33°. η + at -190° (22). 2. *Amylene*, *techn.*: S. < -188°. Fl. η > petrol ether, *q.v.* (18, 22). 3. *Propane*: S. at -187.8°. B. at -37°. Fl. 4. *Propylene*: S. at -185.2°. B. at -47°. Fl. May be used -190° to -160°. Moisture causes turbidity (25). 5. *Butane*, *techn.*: η - at -180°. Fl. Gas at ordinary temp. (24). 6. *Methyl chloride* 25% + *methyl ether* 75%, E.: S. at -154°. B. < -20°. Fl. (4). 7. *Isopentane*: S. at -159.6°. B. at 28.0°. Fl. SS. (37).

From -150° to -125°.—8. *Pentane*, *techn.*: S. < -190° for some samples. B. ca. 25°. Fl. (16). η varies with diff. samples. Cf. (5, 7, 16, 17, 22, 24, 31). 9. *Petroleum ether*: one sample S. at -160° (7). Other samples used down to -130° (16); -135° (5); -150° (15, 30); -160° (25). Fl. 9a. *Chloroform* 18% + *trans-dichloroethylene* 13% + *trichloroethylene* 20% + *ethyl bromide* 41% + *ethyl chloride* 8%: S. < -150°. Non-Fl. η_{-140} 0.71 poises, η_{-150} 6.3 poises (21). 10. *Chloroform* 15% + *methylene chloride* 25% + *trans-dichloroethylene* 11% + *trichloroethylene* 16% + *ethyl bromide* 33%: S. ca. -150°. Non-Fl. η_{-140} = 0.85 poises, η_{-150} = 15 poises (21). 11. *Ethyl chloride*: S. at -138.7°. B. 12.2°. Fl. η - at -138.7° (21). Cor. - (20, 19). Non-Fl. by adding *methyl bromide* (13). 12. *Chloroform* 20% + *trans-dichloroethylene* 14% + *trichloroethylene* 21% + *ethyl bromide* 45%. E.: S. at -139°. Non-Fl. η_{-130} = 0.29 poises; η_{-140} = 0.81 poises (21). 13. *Methyl ether*: S. at -138.5°. B. at -23.7°. Fl. 14. *n-Pentane*: S. at -130.8°. Fl. Very volatile. 15. *Ethyl ether* 75 vol. % + *toluene* 25 vol. %: S. ca. -130° (7). 16. *Methylcyclohexane*: S. at -126.3°. Fl. SS. (37). 17. *Petroleum distillate*, d_4^{15} 0.713: pasty ca. -125°. S. ca. -147° (6).

From -125° to -100°.—18. *Chloroform* 23% + *ether* 77%, E.: S. at -121.7° (35). 19. *Ethyl bromide*: S. at -119°. Non-Fl. Becomes Cor. under action of light (10). η_{-119} = 0.053 poises (21). 20. *Ethyl ether*: S. at -116.3° and (metastable) at -123.3°. Fl. SS. (37). 21. *Carbon disulfide*: S. at -111.6°. Fl. toxic. SS. (37). 22. *Chloroform* 27% + *methylene chloride* 60% + *carbon tetrachloride* 13%. E.: S. at -111°. Non-Fl. η - at -111° (21).

From -100° to -90°.—23. *Chloroform* 31% + *trichloroethylene* 69%. E.: S. at -100°. Non-Fl. η - at -100° (21). 24. *Chloroform* 71% + *ether* 29%. E.: S. at -97.4° (35). 25. *Methylene chloride*: S. at -97°. Volatile but non-Fl. η - at -97° (21). Addition of alcohol recommended to avoid formation of HCl in light (28). 26. *Chloroform* 79% + *ether* 21%. E.: S. at -95° (35). 27. *Toluene*: S. at -95.1°. Fl. η + at -80° (24). SS. (37). 28. *Acetone*: S. at -94.6°. Fl. $\eta_{-89.7}$ = 0.0205 poise (1). 29. *Methyl chloride*: S. at -91.5°. B. at -24.1°. Fl., and non-Fl. by adding *methyl bromide* (14). Cor. -.

From -90° to -80°.—30. *Ethyl alcohol*: S. at -114.1°. Fl. η + near -114° (18, 39). η increased by presence of H₂O (24). Used down to -80° (15, 16) and to -90° (24). 31. *Trichloroethylene*: S. at -86.4°. Non-Fl. η - at -86°. Cor. -, when pure but + when ox. by air. 32. *Ethyl acetate*: S. at -83.6°. Fl. SS. (37). 33. *Carbon tetrachloride* 49% + *chloroform* 51%. E.: S. at -81°. Non-Fl. η - at -81° (21). 34. *trans-Dichloroethylene*: S. at -80.5°. Fl. (9), but less so than vol. hydrocarbons (21). Cor. -.

From -80° to -50° .—35. *Ethyl ether* 80% + *ethyl alcohol* 20%: Fl. Used down to -78° . η < alcohol. Less turbid from moisture than is ether (25). 36. H_2SO_4 , 38% in H_2O , E.: S. at -75° . η + at low temps. Cor. (23). 37. *Chloroform*: S. at -63.5° . Non-Fl. η - at -63° (21). Cor-. SS. (37). A small quantity of alcohol prevents decomposition. 38. $CaCl_2$, 29.8% in H_2O . E.: S. at -55° : η + at -55° (38). Cor. + (32, 41). Cor. diminished by addition of K_2CrO_4 (27).

From -50° to -25° .—39. *Gasolene* + CCl_4 : Depending upon the density of the gasolene the following %'s of CCl_4 should be used to reduce Fl. 0.765, 30%; 0.725, 45%; 0.700, 60%; 0.680, 70% (2, 28). The 65% CCl_4 may be used at -50° . Flash pt. ca. 50° . Cor- (8). 40. *Chlorobenzene*: S. at -45.2° . Fl. SS. (37). 41. $NaCNS$ 500 g per l H_2O , E.: S. at ca. -33° . Cor. < $NaCl$ or $CaCl_2$ (36). 42. *Ethyl alcohol* 25% + *glycerine* 25% + *water* 50%: Used to -30° (40).

From -25° to 0° .—43. *Carbon tetrachloride*: S. at -22.9° . Non-Fl. η - at -23° (21). Cor-. SS. (37). 44. $NaCl$ 22.4% in water, E.: S. at -21.2° . η -. Cor.

DISTILLATES FROM GALICIAN PETROLEUM(11)

Fractionation temp.	24°-40°	40°-60°	60°-80°	80°-100°	100°-120°
d_{4}^{15}	0.6324	0.6593	0.7005	0.7351	0.7495
S. at	-203°	-198°	-185°	-170°	-151°

Fractionation temp.	120°-140°	140°-160°	160°-180°	180°-200°	200°-220°
d_{4}^{15}	0.7625	0.7738	0.7872	0.7962	0.8072
S. at	-139°	-127°	-112°	-104°	-93°

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Archibald and Ure, 4, 128: 726; 24. (2) Associated Factory Mutual Fire Insurance Cos., Quart. Nat. Fire Protect. Assoc. 11: 173; 17. (3) Baudin, 34, 123: 1207; 01. (4) Baume, 48, 12: 216; 14. (5) Beckmann and Waentig, 23, 67: 17; 10. (6) Cabot, 54, 26: 813; 07. (7) Cardosi, 48, 13: 312; 16. (8) Cragoe, McKelvy and O'Connor, 31A, 18: 707; 23. (9) Fabre, 48, 21: 268; 20. (10) Fischer, Die neueren Arzneimittel, 6th ed., p. 74. (11) Formánek, Knop and Korber, 136, 41: 731; 17. (12) Hammerl, 75, 78: 59; 78. (13) Hennig, U. S. Pat. 1,393,124; Brit. Pat. 158,494; 20. (14) Henning, U. S. Pat. 1,386,497; Canadian Pat. 213,825. (15) Henning, 343, 23: 33; 13. (16) Henning, 368, p. 261. (17) Hoffmann and Rothe, 343, 27: 265; 07. (18) Holborn and Wien, 8, 59: 213; 96. (19) Jenkin, 83, 18: 197; 22. (20) Jenkin and Shorthose, 116, 116: 761; 23. 346, 66: 347; 24. (21) Kanolt, Bur. Stands., O. (22) Kohlrausch, 8, 60: 463; 97. (23) Pickering, 4, 67: 331; 90. (24) Loomis and Walters, Bur. Mines, O. (25) Maass and Wright, 1, 43: 1098; 21. (26) Meyerhoffer and Saunders, 7, 31: 381; 99. (27) Pedersen, U. S. Pat. 1,405,320. (28) Remington and Wood, U. S. Dispensatory, 20th ed.; 18. (29) Rooseboom, 7, 4: 42; 99. (30) Rothe, 343, 23: 14, 33; 02. (31) Rothe, 343, 23: 192; 02. (32) Rudnick, 45, 11: 668; 19. (33) Ruff and Fischer, 25, 26: 421; 03. (34) Saposhnikov, 345, 6: 384. (35) Smits and Berckmans, 64P, 21: 401; 19. (36) Sperr, U. S. Pat. 1,473,327. (37) Timmermans, Van der Horst and Onnes, 34, 174: 365; 22. Timmermans, 28, 22: 95; 23. (38) Tucker, 67, 25: 111; 13. (39) Wahl, 5, 87: 371; 12. (40) Walton and Judd, 50, 18: 717; 14. (41) Zimmerman, 344, 9: 307; 21. (42) Thiele and Schulte, 7, 96: 312; 20.

LABORATORY METHODS FOR THE PRODUCTION OF COLD

C. W. KANOLT

(a) Liquids for Cooling by Vaporization into the Atmosphere

The liquid may be sprayed onto the object to be cooled (2, 3, 4); it may be vaporized by a current of air passed through it, forming a bath in which the object to be cooled is immersed (5); it may be vaporized from a porous vessel (1); or in other ways. The temperatures obtainable from the liquids are approximately in the order of their boiling points given below, but are much lower. Gases with critical temperatures above 20° are not included.

The data given below are, in the order given; boiling point, name of liquid, remarks, and literature.

Remarks: 1. Harmless. 2. Harmful. 3. Flammable. 4. Non-flammable. 5. Anaesthetic.

100° , Water (1, 4). 61.2° , Chloroform (4, 5). 46.2° , Carbon disulphide (2, 3). 40° , Methylene chloride (4, 5). 38.4° , Ethyl bromide (4, 5). 35° - 39° , Amylene, techn. (3, 5). 34.6° , Ethyl ether (3, 5) produces -15° to -20° (2, 5). 13.1° , Ethyl chloride (3, 5) produces -35° (2). 0° - 70° , Volatile petroleum distillates (1, 3). -10.0° , Sulfur dioxide (2, 4). -24.1° , Methyl chloride (3, 5) produces -55° to -60° (1, 2). -33.4° , Ammonia (2, 3). Carbon dioxide (1, 4). (The liquid can not exist at atmospheric pressure. Solid can be obtained by the release of liquid from pressure. Sublimation temperature -78.5° . Used mixed with a liquid (8), produces -112° to -115° (1). -89.8° , Nitrous oxide (4, 5).

LITERATURE

(For a key to the periodicals see end of volume)

- (1) d'Arsonval, 34, 123: 980; 01. (2) Braun, Die Lokalanästhesie, Chapt. 4. (3) Kanolt, 48, 9: 416; 24. (4) Krause, 361, 6: 635; 19. (5) Lawrence, 347, No. 18: 10; 16. (6) Thiele and Schulte, 7, 96: 312; 20.

(b) Freezing Mixtures

To absorb the largest amount of heat, an aqueous freezing mixture should be made with ice, rather than with water, and the other substance used should be cooled to 0° , or as low as possible, before mixing with the ice. To absorb at a given temperature the maximum amount of heat per unit mass of mixture, the proportions of ice and the other cooling agent should be those of a solution, the freezing point of which is the required temperature (8). The eutectic (cryohydric) temperature is the lowest attainable, if the ingredients are precooled sufficiently. Most, if not all, salts when mixed at room temperature with ice, produce sufficient cooling to reach this temperature.

For more extensive information than given here relative to the freezing points of solutions, together with the literature references, see the separate tables of freezing points.

The following mixtures are among the most useful:

(a) Sodium chloride with ice for temperatures down to -21.2° .

(b) Hydrated calcium chloride, $CaCl_2 \cdot 6H_2O$, with ice, for temperatures down to -55° .

Aqueous solutions of sulfuric acid or hydrochloric acid with ice have an advantage over salts with ice in avoiding the delay incident to the solution of the salt.

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal. per g. of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g. of mixture. The * values are heats of fusion of the eutectic, v. (5)
NaCl—H ₂ O (4, 12)	23.4 (E for NaCl.2H ₂ O)	-21.2°				56.4*
	23.1 (E for NaCl)	-22.4°				
	24.8		salt and ice at -1°	-21.3°		
NaNO ₂ —H ₂ O (12, 13)			with ice	-21°		
	33.3		salt and ice at -1°	-17.75°		
	37.E	-18.5°				57.5*
Na ₂ CO ₃ .10H ₂ O—H ₂ O (12)	42.9		water and salt 13.2°	-5.3°		
	5.93E	-2.1°				77.2*
Na ₂ SO ₄ .10H ₂ O—H ₂ O	16.7		salt and ice at -1°	-2.0°		
	3.8E	-1.2°				80.1*
Na ₂ S ₂ O ₅ .5H ₂ O—H ₂ O (13)	30.0E	-11°				
	52.4		water and salt 10.7°	-8.0°		
NaOOCCH ₂ .H ₂ O—H ₂ O (13)	45.9		water and salt 10.7°	-4.7°		
	19.3	-9.0°				71.2*
KCl—H ₂ O (12)	23.1		salt -1° ice 0°	-10.9°		
	11.2E	-3.0°				80.7*
KNO ₃ —H ₂ O (12)	11.5		salt and ice at -1°	-2.85°		
	6.54E	-1.55°				
K ₂ SO ₄ —H ₂ O (12)	9.1		salt and ice at -1°	-1.9°		
	60.0		water and salt 10.8°	-23.7°		
KSCN—H ₂ O (13)	18.7E	-15.8°				75.0*
	20.0		salt and ice at -1°	-15.4°		
NH ₄ Cl—H ₂ O (12)	16.6	-6°	water and salt 0°	-14.0°	12.2	2.6
			ice and salt 0°		78.8	73.6
	31.0		ice and salt at -1°	-16.75°		
	31.2	-12°	water and salt 0°	-26.0°	19.7	6.8
			ice and salt 0°		74.6	65.6
	37.5		water and salt 13.6°	-13.6°		
	41.2	-17.4°				68.4*
	43.3E	-17.5°	water and salt 0°	-33.9°	24.3	8.2
			ice and salt 0°		69.5	57.1
	46.8	-12°	water and salt 0°	-36.4°	25.5	13.6
			water and salt 20°			3.1
			ice and salt 0°		68.1	59.8
	50.3	-6°	water and salt 0°	-39.3°	26.5	19.0
			water and salt 20°			8.9
			ice and salt 0°		66.2	62.1
NH ₄ NO ₃ —H ₂ O (12, 13, 16)	54.1	0°	water and salt 0°	-42.2°	27.6	24.3
			water and salt 20°			14.5
			ice and salt 0°		64.4	64.4
	57.1	5°	water and salt 0°	-44.7°	28.4	28.4
			water and salt 20°			18.8
NH ₄ SCN—H ₂ O (13)	57.1		water and salt at 13.2°	-18.0°		
Ca ₂ Cl ₂ .6HO—H ₂ O (6)	% of hydrated salt 16.9	-4.0°	ice and salt 0°		69.9	66.2

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal. per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g of mixture. The * values are heats of fusion of the eutectic, z. (5)
CaCl ₂ ·6H ₂ O—H ₂ O (6).— Continued	26.8	− 8.1°	ice and salt 0°		63.8	57.3
	34.6	− 12.4°	ice and salt 0°		59.3	50.2
	45.7	− 22.7°	ice and salt 0°		53.0	38.4
	54.9	− 39.9°	ice and salt 0°		48.0	26.0
	58.8E	− 54.9°	ice and salt 0°		45.8	17.7
	63.7	− 33.3°	ice and salt 0°		43.7	27.9
	67.1	− 19.7°	water and salt 0°		14.4	none
			ice and salt 0°		41.9	33.2
			water and salt 0°		15.4	6.7
			ice and salt 0°		41.0	35.0
	69.0	− 14.1°	water and salt 0°		16.0	10.1
			water and salt 20°		none	1.5
			ice and salt 0°		38.7	38.7
			water and salt 0°		17.7	17.7
	74.1	0°	water and salt 20°		none	10.2
			water and salt 0°		19.0	21.6
			water and salt 20°		none	14.7
			water and salt 20°		none	14.7
MgSO ₄ ·12H ₂ O—H ₂ O (5)	% anhyd. salt 19.0	− 3.9°			58.2	
CuSO ₄ ·5H ₂ O—H ₂ O (15)	11.9	− 1.6°			69.0	
ZnSO ₄ ·7H ₂ O—H ₂ O (5)	27.2	− 6.55°			50.9	
FeSO ₄ ·7H ₂ O—H ₂ O (5)	13.0	− 1.8°			67.2	
66.19 % H ₂ SO ₄ —H ₂ O (11)	% of 66.19 % H ₂ SO ₄ 7.1		ice and acid at 0°	− 16°	− 2.1°†	68.6
	11.2		ice and acid at 0°	− 20°	− 3.1°†	62.0
	17.2		ice and acid at 0°	− 24°	− 5.5°†	52.9
	23.9		ice and acid at 0°	− 28°	− 9.5°†	43.0
	33.6		ice and acid at 0°	− 32°	− 16.5°†	24.5
	44.2		ice and acid at 0°	− 36°	− 30.2°†	7.5
	47.7		ice and acid at 0°	− 37°	− 37°†	0
HCl—H ₂ O	% HCl 24.8E	− 86°				
Na ₂ SO ₄ ·10H ₂ O—36.69 % HCl (14)	% of Na ₂ SO ₄ ·10H ₂ O 21.05		0°		6.09	
	30.33		0°		9.17	
	36.59		0°		11.15	
	37.69		21.2°	− 8.1°		
	42.37		0°		13.15	
	50.22		21.6°	− 12.2°		
	62.67		15°			{ 21.2 at 0° 12.0 at − 15°
	62.96		21.6°	− 15.3°		
	63.88		0°		28.89	
	74.64		15°			{ 30.6 at 0° 19.1 at − 15°
	74.68		0°		30.85	
	75.30		21.5°	− 14.8°		
	78.90		0°		27.43	
	86.63		15°			{ 24.5 at 0° 13.4 at − 15°
	86.72		0°		19.44	
	88.53		20.1°	− 15.6°		

† Temperature when all ice is melted.

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal. per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g of mixture. The ° values are heats of fusion of the eutectic, v. (6)
Na ₂ SO ₄ ·10H ₂ O—30.13% HCl (14)	% of Na ₂ SO ₄ ·10H ₂ O 46.04		19.7°	-11.8°		
	49.74		19.7°	-11.8°		
	63.46		19.7°	-14.4°		
	65.23		20.4°	-15.6°		
	75.43		20.0°	-14.8°		
	82.54		19.9°	-17.2°		
	86.31		20.0°	-12.6°		
	89.88		20.4°	ca. 0°		
Na ₂ SO ₄ ·10H ₂ O—24.47% HCl (14)	% of Na ₂ SO ₄ ·10H ₂ O 35.54		0°		12.67	
	38.16		19.9°	-8.2°		
	50.42		19.8°	-10.0°		
	62.22		0°		26.84	
	63.86		20.5°	-12.0°		
	67.57		0°		27.18	
	71.46		0°		25.72	
	75.36		21.0°	-11.8°		
C ₂ H ₅ OH—H ₂ O (10)	% alc. 50	-37°	alc. at 2° ice at 0°	-24.2°		
			alc. at 1.5° ice at -1°	-29.4°		
	51.3	-38°	alc. at 4° ice at 0°	ca. -30°		
CS ₂ —(CH ₃) ₂ CO	A temperature of -43.5° in a volume of 20 cc was maintained by mixing 100 cc of carbon disulfide and 70 cc of acetone per hour, using a heat interchanger (3).					

Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal weight of a salt or of a mixture of salts in equal parts (7)	Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal weight of a salt or of a mixture of salts in equal parts (7)
NH ₄ Cl			14°	NaNO ₃ —KCNS	-37.4°	(1)	
NaCl			4°	KNO ₃ —NH ₄ CNS	-28.2°	(1)	
KCl			12°	NH ₄ Cl—NH ₄ NO ₃ —KNO ₃	-22.6°	(9)	
NH ₄ NO ₃			25°	NH ₄ Cl—NH ₄ NO ₃ —NaNO ₃	-30.1°	(9)	
NaNO ₃			9.5°	NH ₄ Cl—Na ₂ SO ₄ ·10H ₂ O—KNO ₃			17°—23°
KNO ₃			10°	NH ₄ Cl—(NH ₄) ₂ SO ₄ —K ₂ SO ₄	-15.2°	(9)	
NH ₄ SO ₄			8°	NH ₄ Cl—(NH ₄) ₂ SO ₄ —Na ₂ SO ₄ ·10H ₂ O	-19.9°	(9)	
Na ₂ SO ₄ ·10H ₂ O			7.5°	NaCl·2H ₂ O—NaNO ₃ —KNO ₃	-24.6°	(9)	
K ₂ SO ₄			4.5°	KCl—KNO ₃ —K ₂ SO ₄	-11.55°	(2)	
NH ₄ Cl—KNO ₃	-18.2°	(9)	20°	NH ₄ NO ₃ —KNO ₃ —NaNO ₃			16°—27°
NH ₄ Cl—NaNO ₃	-31.5°	(9)	17°	NH ₄ NO ₃ —KNO ₃ —Na ₂ SO ₄ ·10H ₂ O			17°—26°
NH ₄ Cl—NH ₄ NO ₃			22°	NH ₄ NO ₃ —(NH ₄) ₂ SO ₄ —Na ₂ SO ₄ ·10H ₂ O	-19.5°	(9)	
NH ₄ Cl—Na ₂ SO ₄ ·10H ₂ O	-17.6°	(9)	19°				
NH ₄ Cl—K ₂ SO ₄	-18.0°	(9)					
NaCl—KNO ₃			10°				
NaCl·2H ₂ O—KNO ₃	-24.9°	(9)					
KCl—NaNO ₃			11°				
KCl—NH ₄ NO ₃			20°				
NH ₄ NO ₃ —KNO ₃			22°				
NH ₄ NO ₃ —Na ₂ SO ₄ ·10H ₂ O	-19.5°	(9)	26°				
Na ₂ NO ₃ —Na ₂ SO ₄ ·10H ₂ O			10°				

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2. TEMPERATURES ABOVE 0°C

OLAF A. HOUGEN AND ROLAND A. RAGATZ

(a) *Bath Liquids or Vapor Baths with Boiling under Constant External Pressure.*—For heterogeneous systems and solutions *v.* (13). For fire hazards on certain of these liquids *v.* p. 61.

For a more extensive series of liquids arranged in order of boiling points *v.* p. 310.

Substance	Boiling point		Actual range used	Lit.
	At 760 mm	At 100 mm		
Ethyl chloride.....	12.2°	-31.3°	13° to -30°	(23)
Ethyl ether.....	34.5°	-12.1°	(2, 11, 13)	
Carbon disulfide.....	46.3°	-4.8°	46° to -26°	(2, 11, 13, 26, 27, 31, 41)
Acetone.....	56.1°	7.5°	(13, 21)	
Chloroform.....	61.2°	9.7°	(11, 21)	
Methyl alcohol.....	64.5°	20.62°	65° to 49°	(2, 10, 11, 13, 21, 30)
Ethyl alcohol.....	78.5°	34.4°	78° to 40°	(2, 10, 11, 13, 21, 31)
Benzene.....	79.8°	25.8°	81° to 40°	(10, 11, 13, 39)
Water.....	100°	51.7°	145° to 25°	(2, 3, 9, 11, 13, 16, 18, 26, 27, 29, 30, 32, 43)
Toluene.....	110.5°	51.8°	130° to 70°	(10, 13, 21, 29, 32, 39, 45)
Chlorobenzene.....	132.1°	70.3°	132° to 70°	(31, 39)
m-Xylene.....	139.0°	77.8°	140° to 70°	(10, 21, 28, 32, 39, 45)
Isomyl acetate.....	142.5°		141° to 119°	(30, 45)
Bromobenzene.....	156.2°	90.7°	160° to 120°	(28, 31)
Aniline.....	184.4°	119.4°	184° to 150°	(27, 31, 32, 39, 42, 45)
Ethyl benzoate.....	213.2°	142°	(21, 27, 45)	
Naphthalene.....	217.9°	144.3°	(28, 39)	
Methyl salicylate.....	223.3°	151°	225° to 175°	(31)
Quinoline.....	237.7°	166.7°	238° to 170°	(15, 21, 39, 45)
Isomyl benzoate.....	262°		(21, 28, 45)	
α-Bromonaphthalene.....	281.1°	198.8°	281° to 215°	(28, 31)
Diphenylamine.....	302.0°	221°	(5, 15, 28, 39, 45)	
Benzophenone.....	305.4°	224°	306° to 257°	(28, 39)
Mercury.....	356.9°	261.5°	Various ranges	(2, 5, 31, 39)
Sulfur.....	444.6°	330.7°	Various ranges	(2, 5, 4, 39)
Phosphorus pentasulfide.....	52°		(5)	
Zinc.....	907°	758°	(2)	

(b) *Solid-liquid Non-variant Points.*—1. Ice-water, *v.* (11, 24, 29, 46). 2. Transformation temperatures of crystalline hydrates.

Salt	Hydration temperature °C	Lit.
Sodium chromate.....	19.71	(12, 33)
Sodium sulfate.....	32.383	(11, 12, 32, 33, 34, 35)
Sodium carbonate.....	35.3	(12, 33)
Sodium thiosulfate.....	48.0	(12, 33)
Sodium bromide.....	50.8	(12, 33)
Manganese chloride.....	57.8	(12, 33)
Trisodium phosphate.....	73.4	(12, 33)
Barium hydroxide.....	78.0	(12, 33)

(c) *Bath Liquids with Thermostatic Control.*

Liquid	Useful range	Lit.
Water.....	0° to 90°	(17, 18, 21, 40)
Mineral oils.....	To 20° below the flash point	(5, 19, 22, 37, 38, 40)
Paraffin.....	M.P. to 300°	(5, 27, 29, 40)
10 parts cottonseed oil, 1 part beeswax.....	M.P. to 300°	(7)
Hydrogenated sesame oil.....	60° to 300°	(36)
Hydrogenated cottonseed oil.....	60° to 285°	(36)

Fused salts	Melting point	Lit.
NaNO ₃ (45 %), KNO ₃ (55 %)....	218°	(8, 14, 21, 32, 44)
NaNO ₃ (55 %), NaNO ₂ (45 %) ..	221°	(44)
KNO ₃	337°	(1)
NaCl (28 %), CaCl ₂ (72 %).....	500°	(44)
NaCl (50 %), K ₂ CO ₃ (50 %).....	560°	(44)
Na ₂ CO ₃ (50 %), KCl (50 %).....	560°	(44)
CaCl ₂ (50 %), BaCl ₂ (50 %).....	600°	(44)
NaCl (35 %), Na ₂ CO ₃ (65 %).....	620°	(44)
NaCl (22 %), BaCl ₂ (78 %).....	654°	(44)
NaCl (44 %), KCl (56 %).....	663°	(44)

Molten metals	Useful range	Lit.
Lead.....	327° to 700°	(4, 5, 6, 29)
Lead (30 %), Tin (70 %).....	Above 183°	(14)
Lead (50 %), Tin (50 %).....		(5)

Other liquids	Useful range	Lit.
Naphthalene.....	80° to 217°	(20, 21, 25)
Benzophenone.....	49° to 305°	(20, 21, 25)
Sulfur.....	113° to 444°	(20, 25)

(d) *Metal Blocks.*—Aluminum and copper blocks have been used up to 600°, with a uniformity of temperature of 1° (39).

(e) *Gas Baths and Furnaces.*—For temperatures above 900°, an electrically heated gas bath is usually employed, although for the higher temperatures a bath material is not essential since heat transfer takes place primarily by radiation. For lower temperatures, heat transfer and temperature uniformity are promoted by packing with a granular non-oxidizing metal.

The following references (compiled by the Geophysical Laboratory) deal with the construction and temperature regulation of high temperature furnaces: Kolovrat, 51, 8: 495; 09. Haughton and Hanson, 47, 14: 145; 15. 18: 173; 17. White and Adams, 2, 14: 44; 19. Haagen, 101, 40: 670; 19. Roberts, 128, 11: 409; 21. 48, 6: 965; 22. Bunting, 38, 6: 1209; 23. Adams, 48, 9: 599; 24. Roberts, 48, 10: 723; 25.

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- (1) Aten, 7, 78: 13; 12. (2) Barus and Hallock, 166, No. 54: 89. (3) Brown, 3, 7: 411; 79. (4) Bodenstein, 7, 29: 665; 99. (5) Bodenstein, 7, 30: 113; 99. (6) Bodenstein, 7, 30: 125; 99. (7) Bosart, 1, 31: 724; 09. (8) Day and Soeman, 8, 38: 849, 853; 12. (9) Dupre, 173, 38: 308; 13. (10) Forster, 136, 106: 80; 12. (11) Freas, Thesis, Chicago; 11. (12) Geer, 60, 6: 85; 02. (13) Golodets, 136, 38: 1253; 14. (14) Goodwin and Mailey, 2, 28: 469; 07. (15) Gordon, 7, 38: 305; 99. (16) Grutmacher, Deutsch. Mech.-Ztg. 1902: 193. (17) Grutmacher, Deutsch. Mech.-Ztg. 1902: 184. (18) Grutmacher, 89, 3: 248, 260; 00. (19) Holborn and Henning, 8, 23: 810; 07. (20) Holborn and Henning, 8, 26: 860; 08. (21) Holborn, Scheel and Henning, 863. (22) Holborn and Schultze, 8, 47: 1101; 15. (23) Jenkin, 83, 18: 197; 22. (24) Marshall, 83, 7: 249; 11. (25) Meisner, 8, 39: 1230; 12. (26) Meyer, 15, 165: 303; 73. (27) Moser, 98, 34: 625; 21. (28) Noyes, 152, No. 63: 12, 73, 194, 240; 07. (29) Ostwald-Luther, 884, p. 100. (30) Pomplun, 243, 11: 1; 91. (31) Ramsay and Young, 4, 47: 640; 85. (32) Richards, 46, 4: 910; 12. (33) Richards and Churchill, 7, 23: 313; 99. (34) Richards and Mark, 65, 38: 417; 02. (35) Richards and Wells, 65, 38: 431; 02. (36) Robertson, 45, 15: 701; 23. (37) Rothe, 243, 19: 144; 99. (38) Shaw, 89, 11, III: 129; 17. (39) Stähler, 865, 1: 501. (40) Stähler, 865, 1: 498. (41) Stock, Henning and Kuss, 26, 84: 1119; 21. (42) Sudborough, 54, 18: 16; 99. (43) Thiesen, Scheel and Sell, 69, 3: 140; 95. (44) Tour, 212, 6: 171; 24. (45) Wiebe and Böttcher, 243, 10: 16; 90. (46) Washburn and Williams, 1, 35: 741; 13.

MAXIMUM TEMPERATURES THAT CAN BE REACHED AND MAINTAINED FOR OBSERVATIONAL PURPOSES BY VARIOUS MEANS

W. E. FORSYTHE

	Maximum temperature, °C
Electric furnaces operating in open air	
Iron tube or iron wire wound furnace.....	500
Nicrome wound refractory tube.....	800
Platinum wound refractory tube—double winding (2).....	1530
Iridium tube.....	1900
Carbon resistor furnace.....	2200
Carbon arc furnace.....	3200
Electric furnaces operating in vacuo or inert gas	
Tungsten wound refractory tube limited by refractory tube.....	2000
Carbon tube furnace.....	2700
Tungsten tube furnace (in vacuo).....	2200
Tungsten tube furnace (in inert gas).....	2800
Gas-fired furnaces	
Special makes of furnaces(5) with flames entering the furnace in tangential direction so as to give a good distribution of the heat, if gas and air are well mixed, can be raised up to about.....	1700

	Maximum temperature °C
The regenerative furnaces, such as are used in open hearth steel furnaces, can be heated up to about the same temperature of.....	1700
Special furnaces and methods	
High-frequency induction furnace. Limited only by melting point of refractory or metal used	
Filament in vacuum or inert gas limited only by rate of vaporization or melting point of filament used	
Arc under pressure	
Carbon (4).....	5790
Tungsten (3).....	4785
Exploding fine wires by discharging a condenser charged to high voltage through them gives a temperature up to about (1).....	19700

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(For a key to the periodicals see end of volume)

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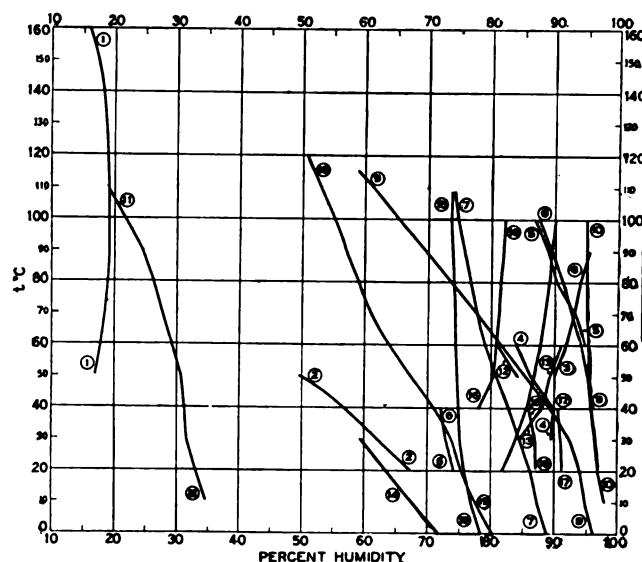
LABORATORY METHODS FOR MAINTAINING CONSTANT HUMIDITY

HUGH M. SPENCER

A saturated aqueous solution in contact with an excess of a definite solid phase at a given temperature will maintain a constant humidity within any enclosed space around it. By properly selecting the salt to be used almost any desired degree of humidity can be secured and controlled in this way. A number of salts suitable for this purpose are displayed in the accompanying chart and tables, together with the % humidity prevailing above their saturated solutions at different temperatures. To convert “% humidity” into “aqueous tension” multiply it by the vapor pressure of pure water at the same temperature.

SOLID PHASE

1. $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ (19).
2. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ (8).
3. $\text{CoSO}_4 \cdot 6\text{H}_2\text{O}$ (7).
4. $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ (8, 13, 22).
5. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (11, 16).
6. $\text{K}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}$ (4).
7. KCl (4, 5, 9, 18, 21).
8. KClO_3 (5, 11, 16).
9. KNO_3 (4, 5, 9, 16).
10. K_2SO_4 (4, 5, 15, 20).
11. $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (8, 13).
12. $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$ (7).
13. $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ (7).
14. NH_4NO_3 (9, 18).
15. NaCl (4, 5, 18, 21).
16. $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ (10, 22).
17. $\text{Na}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$ (14).
18. $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ (14).
19. NaNO_3 (4, 5, 9, 18, 21).
20. Na_2SO_4 (4, 16, 24, 26).



Solid phases	t , °C	% humidity	Lit.
$\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$	24.5	88	(15)
$\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$	5	39.8	(20)
	10	38	(19)
	18.5	35	(15)
	20.0	32.3	(19)
	24.5	31	(15)
$\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$	18.5	56	(15)
	24.5	51	(15)

Solid phases	t , °C	% humidity	Lit.
$\text{CaSO}_4 \cdot 5\text{H}_2\text{O}$	20	98	(15)
CrO_3	20	35	(15)
$\text{H}_2\text{C}_4\text{O}_4 \cdot 2\text{H}_2\text{O}$	20	76	(15)
$\text{H}_3\text{PO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	24.5	9	(15)
$\text{KC}_4\text{H}_4\text{O}_6$	20	20	(15)
	168	13	(11)
KBr	20	84	(15)
	100	69.2	(5)

Solid phases	t , °C	% humidity	Lit.	Solid phases	t , °C	% humidity	Lit.
K ₂ CO ₃ ·2H ₂ O.....	18.5	44	(15)	Na ₂ Cr ₂ O ₇ ·2H ₂ O.....	20	52	(15)
	24.5	43	(15)	NaF.....	100.0	96.6	(5)
KCNs.....	20	47	(15)	Na ₂ HPO ₄ ·12H ₂ O.....	20	95	(15)
K ₂ CrO ₄	20	88	(15)	NaHSO ₄ ·H ₂ O.....	20	52	(15)
KF.....	100.0	22.9	(5)	NaI.....	100.0	50.4	(5)
K ₂ HPO ₄	20	92	(15)	NaNO ₂	20	66	(15)
KHSO ₄	20	86	(15)	Na ₂ SO ₄ ·7H ₂ O.....	20	95	(15)
KI.....	100.0	56.2	(5)	Na ₂ S ₂ O ₅ ·5H ₂ O.....	20	78	(15)
KNO ₃	20	45	(15)	Na ₂ SO ₄ ·10H ₂ O.....	20	93	(15)
LiCl·H ₂ O.....	20	15	(15)	Pb(NO ₃) ₂	20	98	(15)
Mg(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	20	65	(15)		103.5	88.4	(11)
Mg(NO ₃) ₂ ·6H ₂ O.....	18.5	56	(15)	TiCl.....	100.097	99.7	(4)
	24.5	52	(15)	TiNO ₂	100.317	98.7	(4)
NH ₄ Cl.....	20.0	79.2	(9)	Ti ₂ SO ₄	104.7	84.8	(4)
	25.0	79.3	(9)	ZnCl ₂ ·1½H ₂ O*.....	20	10	(15)
	30.0	79.5	(9)	Zn(NO ₃) ₂ ·6H ₂ O.....	20	42	(15)
NH ₄ Cl and KNO ₃	20.0	72.6	(9)	ZnSO ₄ ·7H ₂ O.....	5	94.7	(20)
	25.0	71.2	(9)		20	90	(15)
	30.0	68.6	(9)				
NH ₄ H ₂ PO ₄	20.0	93.1	(9)				
	25.0	93.0	(9)				
	30.0	92.9	(9)				
(NH ₄) ₂ SO ₄	20.0	81.0	(9)				
	25.0	81.1	(9)				
	30.0	81.1	(9)				
	108.2	75	(11)				
NaBr.....	100.0	22.9	(5)				
NaBr·2H ₂ O.....	20	58	(15)				
NaBrO ₃	20	92	(15)				
NaCl and KClO ₃	16.39	36.58	(6)				
NaCl and KNO ₃	16.39	32.57	(6)				
NaCl, KNO ₃ and NaNO ₃	16.39	30.49	(6)				
NaC ₂ H ₃ O ₂ ·3H ₂ O.....	20	76	(15)				
Na ₂ CO ₃ ·10H ₂ O.....	18.5	92	(15)				
	24.5	87	(15)				
NaClO ₃	20	75	(15)				
	100.0	54	(5)				

* Unstable at this temperature.

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(For a key to the periodicals see end of volume)

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BAROMETRY AND MANOMETRY

H. H. KIMBALL

1. *Gravity Correction.*—The equivalent barometric, or other manometric, height (B_s) corresponding to standard gravity ($g_s = 980.665 \text{ cm sec}^{-2}$) is related to the height (B_l) corresponding to local gravity (g_l) as shown by equation (1):

$$B_s = B_l \frac{g_l}{g_s} = B_l + C_g; \quad C_g = B_l \frac{g_l - g_s}{g_s} \quad (1)$$

When g_l and g_s are expressed in cm sec^{-2} ,

$$C_g = B_l \left[\frac{(g_l - g_s)(1.0197)}{1000} \right]$$

Any desired unit may be used for B_l ; C_g and B_s are in the same unit as B_l . [For most barometric purposes, a sufficiently accurate correction (within $\pm 0.01\%$ of B_l) is obtained by the use of the

approximate correction $C_g' = B_l \frac{g_l - g_s}{g_s}$, in which B_l is the usual barometric pressure at the station.]

Example: $B_l = 29.851$, $g_l = 978.053 \text{ cm sec}^{-2}$. Then $(g_l - g_s) = -2.612 \text{ cm sec}^{-2}$; $0.0197(g_l - g_s) = -0.0515 \text{ cm sec}^{-2}$; $1000 C_g = -2.663 B_l = -79.49$. $\therefore B_s = 29.851 - 0.079 = 29.772$.

2. *Temperature Correction.*—The equation by which the equivalent barometric, or other manometric, height (B) at the standard temperature (t_m) can be computed from the nominal height (B') at the temperature t , is generally written in the form

$$B = B' + C_t; \quad C_t = B' \frac{l(t - t_m) - m(t - t_m)}{1 + m(t - t_m)} \quad (2)$$

where t_m = standard temperature of the manometric liquid, t = temperature at which the scale, after correction for errors of graduation, reads correctly, m = coefficient of cubical expansion of the manometric liquid, l = coefficient of linear expansion of the material on which the scale is engraved.

The value of m which is generally used for mercury, and which has been adopted by the International Meteorological Tables, is $m = 181.8 \times 10^{-6}$ per °C. For temperatures between 0°C and 30°C this value appears (5, 6, 8, 15, 17) to be correct within $\pm 0.1 \times 10^{-6}$ per °C. The value of l , for brass, which has been adopted by the International Meteorological Tables, is $l = 18.4 \times 10^{-6}$ per °C. The best determinations (1, 2, 11) of this coefficient for temperatures between 0° and 30° yield values varying from

17.5×10^{-6} per °C to 19.3×10^{-6} per °C, or by $\pm 5\%$. For glass scales the approximate value $l = 8.5 \times 10^{-6}$ per °C is usually satisfactory. (For silicate flint glasses ⁽¹³⁾ l varies from 7.88×10^{-6} per °C to 9.35×10^{-6} per °C; for crown glasses ⁽¹³⁾ it varies from 6.75×10^{-6} to 9.54×10^{-6} per °C.

For barometers with metric scales, the combined effect of an error of $\pm 0.1 \times 10^{-6}$ per °C in m and of $\pm 0.9 \times 10^{-6}$ per °C in l

will cause an error in C_t of $\pm \frac{B't \times 10^{-6}}{1 + mt}$. For $t = 30^\circ\text{C}$ and $B' = 760$ mm, the error would be ± 0.023 mm; while for $t = 10^\circ\text{C}$, $B' = 100$ mm, it would be only ± 0.001 mm. At ordinary room temperatures, the error so produced in C_t will be less for barometers graduated in inches than for one graduated in millimeters. (For barometers graduated in inches $t_m = 62^\circ\text{F}$, $t_s = 32^\circ\text{F}$).

TABLE 1.—TEMPERATURE CORRECTION (C_t) FOR MERCURIAL MANOMETERS AND BAROMETERS

$B = B' + C_t$; (B' = nominal height at t° ; B = equivalent height for mercury at 0°C ; B , B' , and C_t are all in the same unit, which may be anything desired)

A. Brass scale correct at 62°F , inches, °F; $t_m = 32^\circ\text{F}$, $t_s = 62^\circ\text{F}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C
(Applies directly to commercial barometers graduated in inches)

$t(^\circ\text{F}) \backslash B'$	10	20	30	40	50	60	70	80	90
+12	+0.015	+0.030	+0.045	+0.061	+0.076	+0.091	+0.106	+0.121	+0.136
22	+0.006	+0.012	+0.018	+0.024	+0.030	+0.036	+0.042	+0.048	+0.054
32	-0.003	-0.006	-0.009	-0.012	-0.015	-0.018	-0.021	-0.024	-0.028
42	-0.012	-0.024	-0.036	-0.049	-0.061	-0.073	-0.085	-0.097	-0.109
52	-0.021	-0.042	-0.064	-0.085	-0.106	-0.127	-0.148	-0.169	-0.191
62	-0.030	-0.060	-0.091	-0.121	-0.151	-0.181	-0.211	-0.242	-0.272
72	-0.039	-0.078	-0.118	-0.157	-0.196	-0.235	-0.275	-0.314	-0.353
82	-0.048	-0.096	-0.145	-0.193	-0.241	-0.289	-0.338	-0.386	-0.434
92	-0.057	-0.114	-0.172	-0.229	-0.286	-0.343	-0.400	-0.458	-0.515

B. Brass scale correct at 0°C , millimeters, °C; $t_m = t_s = 0^\circ\text{C}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C

$t(^\circ\text{C}) \backslash B'$	100	200	300	400	500	600	700	800	900
-10	+0.16	+0.33	+0.49	+0.65	+0.82	+0.98	+1.15	+1.31	+1.47
-5	+0.08	+0.16	+0.25	+0.33	+0.41	+0.49	+0.57	+0.65	+0.74
0	0.00								
+5	-0.08	-0.16	-0.24	-0.33	-0.41	-0.49	-0.57	-0.65	-0.73
10	-0.16	-0.33	-0.49	-0.65	-0.82	-0.98	-1.14	-1.30	-1.47
15	-0.24	-0.49	-0.73	-0.98	-1.22	-1.47	-1.71	-1.96	-2.20
20	-0.33	-0.65	-0.98	-1.30	-1.63	-1.95	-2.28	-2.60	-2.93
25	-0.41	-0.81	-1.22	-1.63	-2.03	-2.44	-2.85	-3.25	-3.66
30	-0.49	-0.98	-1.46	-1.95	-2.44	-2.93	-3.41	-3.90	-4.39
35	-0.57	-1.14	-1.70	-2.27	-2.84	-3.41	-3.98	-4.55	-5.11
40	-0.65	-1.30	-1.95	-2.60	-3.24	-3.89	-4.54	-5.19	-5.84

C. Glass scale correct at 0°C , $t_m = t_s = 0^\circ\text{C}$, $m = 181.8 \times 10^{-6}$ per °C, $l = 8.5 \times 10^{-6}$ per °C

$t(^\circ\text{C}) \backslash B'$	100	200	300	400	500	600	700	800	900
-10	+0.17	+0.35	+0.52	+0.69	+0.87	+1.04	+1.22	+1.39	+1.56
-5	+0.09	+0.17	+0.26	+0.35	+0.43	+0.52	+0.61	+0.69	+0.78
0	0.00								
+5	-0.09	-0.17	-0.26	-0.35	-0.43	-0.52	-0.61	-0.69	-0.78
10	-0.17	-0.35	-0.52	-0.69	-0.86	-1.04	-1.21	-1.38	-1.56
15	-0.26	-0.52	-0.78	-1.04	-1.30	-1.56	-1.81	-2.07	-2.33
20	-0.34	-0.69	-1.04	-1.38	-1.73	-2.07	-2.42	-2.76	-3.11
25	-0.43	-0.86	-1.29	-1.73	-2.16	-2.59	-3.02	-3.45	-3.88
30	-0.52	-1.03	-1.55	-2.07	-2.59	-3.10	-3.62	-4.14	-4.65
35	-0.60	-1.21	-1.81	-2.41	-3.01	-3.62	-4.22	-4.82	-5.42
40	-0.69	-1.38	-2.06	-2.75	-3.44	-4.13	-4.82	-5.51	-6.19

Example: Barometer graduated in inches, brass scale correct at 62°F ; $B' = 29.564$ in., $t = 76.8^\circ\text{F}$. From section A it is found that at 72° , C_t for $B' = 29.564$ is -0.1155 , at 82° it is -0.1421 ; hence at 76.8° , $C_t = -0.1155 + \frac{4.8}{10}(-0.0266) = -0.1155 - 0.0128 = -0.128$. Hence $B = 29.564 - 0.128 = 29.436$ in.

3. Capillary Corrections.—The curvature of the surfaces of the manometric liquid introduces pressures directed towards the centers of curvature of the surfaces. For each surface, this pressure is

$$\gamma \left(\frac{1}{r_1} + \frac{1}{r_2} \right) \text{ dynes cm}^{-2} = \frac{\gamma}{dg} \left(\frac{1}{r_1} + \frac{1}{r_2} \right) \text{ cm of the manometric liquid.}$$

[γ = surface tension (in dynes cm^{-1}), d = density of the liquid (in g cm^{-3}), g is the acceleration of gravity (in cm sec^{-2}), and r_1 and r_2 are the principal radii of curvature (in cm) of the surface at the point considered.] At the vertex of the meniscus in a tube of circular section, $r_1 = r_2 = r$, and if the angle of contact of the liquid with the tube is either 0° or 180° , and if the tube is not too large, r is practically equal to the internal radius of the tube. If

the liquid surface is in an annular space between coaxial, circular cylinders (as in the reservoir of a Fortin barometer), if the angle of contact is 0° , and if neither r_1 nor $(r_3 - r_2)$ is very great as compared with the capillary constant, (18), then $h' = \frac{2dhr_1}{(r_3 - r_2)^2}$, approximately; h' and h are the respective capillary pressures (in terms of unit column of the liquid) at the vertices of the surfaces in the annular space of width $(r_3 - r_2)$, and in a tube of radius r_1 ; and d is the depth of the annular meniscus.

Laplace (12) has shown that, except for sign, the equations for a convex meniscus are the same as those for a concave one. Hence, this expression can probably be accepted as a first approximation to the value for h' for any liquid, provided that the angle of contact of the liquid with the solid is the same at all three surfaces, and that r_1 and $(r_3 - r_2)$ are not too great. In the case of the ordinary mercurial cistern barometers, $(r_3 - r_2)$ is quite large as compared with the capillary constant of mercury, and the angles of contact may not be the same at all three surfaces; for these reasons, no great confidence can be placed in the actual value of h' , as so computed, for such barometers, but its order of magnitude will probably be correct.

TABLE 2.—CAPILLARY DEPRESSION OF THE APEX OF A MERCURIAL COLUMN IN A GLASS TUBE OF CIRCULAR SECTION*

Depression in millimeters									
Radius of the tube, mm	Height of the meniscus, mm								
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
1.0	2.46	4.40							
1.4	1.26	2.36	3.22						
1.8	0.75	1.44	2.02	2.48					
2.2	0.49	0.95	1.36	1.70	1.98				
2.6	0.34	0.66	0.96	1.22	1.44	1.61			
3.0	0.24	0.48	0.70	0.90	1.07	1.21	1.32		
3.5	0.17	0.34	0.49	0.64	0.76	0.87	0.96	1.04	
4.0	0.12	0.24	0.35	0.46	0.56	0.64	0.71	0.77	0.82
4.5	0.09	0.18	0.26	0.34	0.41	0.47	0.53	0.58	0.62
5.0	0.07	0.13	0.19	0.25	0.30	0.35	0.40	0.44	0.47
5.5	0.05	0.10	0.14	0.19	0.23	0.27	0.30	0.33	0.36
6.0	0.04	0.07	0.11	0.14	0.18	0.20	0.23	0.25	0.27
6.5	0.03	0.06	0.09	0.11	0.14	0.16	0.18	0.20	0.21
7.0	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.15	0.16

* From the Schleiermacher-Delcros (4, 5, 10) table, as revised by Söhring (14). The values are about 5% larger than those obtained from Bravais's (3) table, in which the arguments are the diameter of the tube, and the angle of incidence of the meniscus of the mercurial column with the walls of the tube.

Example: In a barometer cistern for which $r_2 = 6$ mm, $r_3 = 16$ mm, d was found to be 0.5 mm.; the radius of the barometer tube was $r_1 = 5$ mm, and the height of the meniscus in it was 1.0 mm. From Table 2 it is found that the depression h , due to the meniscus in the 5 mm tube, is 0.30 mm; hence $h' = 0.015$ mm. That is, the pressure due to the annular surface is of the order of 0.02 mm; and the total depression of the column is $H = 0.30 - 0.02 = 0.28$ mm, subject to the uncertainty regarding the actual value of h' .

4. *Possible Residual-gas Error in Good Barometers.*—Under ordinary laboratory conditions, errors amounting to as much as 4.1 mm (0.163 in.) have been observed, and errors of 1.1 mm (0.043 in.) are not uncommon; but in most barometers, this error

does not exceed 0.25 mm (0.010 in.) when the instrument is shipped by the manufacturer. Air may be introduced during shipment and by handling. The smaller the tube of the barometer, the more likely is the error to be large. The magnitude of the error varies with the temperature and with the volume of the space above the mercury column, as indicated by equation (3):

$$x = x_0 \frac{V_0}{V} [1 + 0.00367(t - t_0)] \quad (3)$$

where x_0 and x are, respectively, the errors corresponding to the volume V_0 temperature t_0 , and to the volume V temperature t ; temperatures being expressed in $^\circ\text{C}$.

5. *Conversion of Water Column at $t^\circ\text{C}$ to the Equivalent Water Column at 4°C .*—If h_t and h_4 are the equivalent true heights (corrected for scale errors of graduation and expansion, and for capillary pressures), and if d_t and d_4 are the respective densities (7, 16) then, if $\delta = (d_4 - d_t)/d_4$, $h_4 = h_t(1 - \delta)$.

TABLE 3.—VALUES OF 100δ

t ($^\circ\text{C}$)	Units of t				
	0	2	4	6	8
tens					
0	0.013	0.003	0.000	0.003	0.012
1	0.027	0.048	0.073	0.103	0.138
2	0.177	0.221	0.268	0.320	0.375
3	0.435	0.497	0.563	0.633	0.706

Example.— $h_{25} = 67.53$ cm. At 25° , $100\delta = 0.294$. $\therefore \delta h_{25} = 0.199$, $h_4 = h_{25}(1 - \delta) = 67.53 - 0.20 = 67.33$ cm.

6. *Conversion of Water Column at 4°C to Equivalent Mercury Column at Standard Density (13.5951 g cm $^{-3}$); and the Reverse.*—If h_w and h_m are the equivalent true heights (corrected for the scale errors of graduation and expansion, and for all capillary effects) of the water and the mercury, respectively, $h_m = 0.073554h_w$.

TABLE 4.—EQUIVALENT COLUMNS OF WATER (h_w) AND OF MERCURY (h_m)

(Density of water = 0.999973 g cm $^{-3}$; of mercury = 13.5951 g cm $^{-3}$)

h_w	h_m	h_w	h_m	h_m	h_w	h_m	h_w
100	7.3554	600	44.132	1	13.5955	6	81.573
200	14.7108	700	51.488	2	27.1909	7	95.168
300	22.0662	800	58.843	3	40.7864	8	108.764
400	29.4216	900	66.199	4	54.3818	9	122.359
500	36.7770	1000	73.554	5	67.9773	10	135.955

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(For a key to the periodicals see end of volume)

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PSYCHROMETRY; DENSITY OF MOIST AIR; CHANGE IN BAROMETRIC PRESSURE WITH ALTITUDE

F. W. J. WHIPPLE

$B; B_A$	Barometric pressure, in general; at h
C	Instrumental constant
$d; d_h; d_a$	Density of air, in general; at h ; at T_a and A_a
$e; e'$	Pressure of water vapor, present; when in equilibrium with water (or ice) at temperature t'
$g; g_a$	Acceleration of gravity, actual; standard value
$h; H$	Altitude above sea level, cm; meters
$t; t'$	Readings of dry bulb; of wet bulb
$T; T_a; T'$	Absolute temperatures in °C, general; of ice point; "virtual"
x	Ratio (mass of vapor)/(mass of dry air)

1. Psychrometry.—The pressure of the water vapor contained in the air is commonly deduced from the simultaneous readings of wet bulb and of dry bulb thermometers. The difference in these two readings depends upon the heat received by radiation as well as upon that furnished directly by the air. When the air flow is slow, the radiation is an important factor. In the Assmann psychrometer the bulb is surrounded by a double metal sheath; this largely eliminates radiation effects. It is important to secure adequate ventilation by the use of a thermometer with a bulb much smaller than the sheath. The standard bulb is 12 mm long and 4 mm in diameter. Alternatively, the thermometers may be "slung," i.e., whirled on a suitable holder. In this case, direct radiation from sun or sky should be avoided as it affects the dry-bulb readings and therefore the psychrometric difference.

The general formula for the computation of vapor pressure is

$$e' - e = CB(t - t') \times 10^{-4}$$

B , e , and e' are expressed in the same units, which may be anything desired. Within the order of accuracy of psychrometer observations, C is constant for a given velocity of the air-flow past the wet bulb. The relation of C to the air velocity has not been determined very precisely. The variation of C with temperature is negligible. If temperatures are expressed in °C, the value of C for thermometers with adequate ventilation (a relative velocity of 3 m per second or more) is 6.6 when the cover of the wet-bulb is saturated with water. On theoretical grounds, a lower factor, 5.8, is appropriate for an ice-covered bulb, but in the tables in general use 6.6 is adopted in this case as well. (Aspirations Psychrometer Tafeln, Braunschweig, 1908. Ferrel, Report of Chief Signal Officer, p. 248. Washington, 1886.) For the reduction of the readings of thermometers exposed in a Stevenson screen, Regnault's values of C , 8 for water and 7 for ice, are generally recommended (Études sur l'Hygrométrie, p. 102. Paris, 1845.) As, however, the ventilation is indeterminate, the accuracy obtainable is of a lower order.

Relative Humidity is computed by expressing e , determined by the psychrometric formula, as a percentage of the pressure of vapor in equilibrium with water (not ice) at the temperature of the dry bulb.

2. Density of Moist Air*

T, T_a = absolute temperature in °C

* If d_w, d_a = density of vapor and of dry air at same pressure and temperature, $d_w/d_a = 0.6217$ and $(d_a - d_w)/d_a = 0.3783$.

Pressure unit	d
Any unit	$\frac{d_a T_a}{T} \left(\frac{B - 0.3783e}{A_a} \right);$ $\frac{d_a T_a B}{TB_a} \left(\frac{0.6217(1+x)}{0.6217+x} \right)$
Mm Hg	$\frac{464.6}{10^6} \left(\frac{B - 0.3783e}{T} \right) \text{g/cm}^3;$ $\frac{288.9}{10^6} \left(\frac{B(1+x)}{(0.6217+x)T} \right) \text{g/cm}^3$
Kilodynes per cm ²	$\frac{348.5}{10^6} \left(\frac{B - 0.3783e}{T} \right) \text{g/cm}^3$ $\frac{216.7}{10^6} \left(\frac{B(1+x)}{(0.6217+x)T} \right) \text{g/cm}^3$

$$x = \frac{\text{mass of vapor}}{\text{mass of dry air}} = \frac{0.6217 e}{B - e}$$

Tables in Dictionary of Applied Physics 3: 76, and in paper by Shaw and Fahmy in Quart. J. Roy. Meteorological Soc., 1925, 210.

$$\text{Specific humidity} = \frac{\text{mass of vapor}}{\text{total mass}} = \frac{0.6217 e}{B - 0.3783 e}$$

3. Relations Connecting Pressure and Altitude.—V. Bjerknes defines "virtual" temperature (T') as $T' = TB/(B - 0.3783e)$.

$$\frac{dB}{B} = d(\log_e B) = -\frac{gd}{B} dh = -0.03416 \frac{g}{g_a} \frac{dT'}{T'} = -\frac{g}{29.26 g_a} \frac{dT'}{T'} \quad (1)$$

$$d(\log_{10} B) = -\frac{0.014842 g}{g_a} \frac{dT'}{T'} = -\frac{g}{67.38 g_a} \frac{dT'}{T'} \quad (2)$$

If suffix ₁ refers to the lower station and ₂ to the upper, then

$$\log_{10} \frac{B_1}{B_2} = 0.014842 \frac{g}{g_a} \frac{2(H_2 - H_1)}{T'_1 + T'_2}, \text{ approx.} \quad (3)$$

$$B_1 = B_2 \left[1 + 0.03416 \frac{g}{g_a} \frac{2(H_2 - H_1)}{T'_1 + T'_2 - 0.03416 (H_2 - H_1) \frac{g}{g_a}} \right], \text{ approx.} \quad (4)$$

$$H_2 - H_1 = \frac{29.26 g_a}{g} \frac{B_1 - B_2}{B_1 + B_2} (T'_1 + T'_2), \text{ approximately.} \quad (5)$$

For $(H_2 - H_1)$ not exceeding 1000 m, equations (4) and (5) are equivalent to the logarithmic formula. The factor $g/g_a = (1 - 0.002640 \cos 2\phi)(1 - 3.14H \times 10^{-7})$ may generally be taken as unity. The distinction between virtual and actual temperature may be ignored except when high temperatures are involved.

In the determination of heights in an extended barometric survey of a country, allowance must be made for the horizontal pressure gradient. When daily weather maps are available, B_1 may be taken from them as the pressure at sea-level in the neighborhood. If T_1 is not known, the conventional value (adopted by Intern. Meteorological Conference, Innsbruck, 1905) $T_1 = T_2 + 0.005 (H_2 - H_1)$ may be used, but in hot weather $T_1 = T_2 + 0.01 (H_2 - H_1)$ is a better approximation. Value of T_2 observed at a mountain station may differ considerably from the temperature of free atmosphere at same level; this is especially true in calm weather, at night, and in the early morning. (cf. Hesselberg, Int. Meteorol. Conference, Utrecht, 1923, App. L.) Tables of

virtual temperatures: V. Bjerknes, *Dynamic Meteorology*, etc., Washington, 1911. Values of $0.01484/T$: *Computer's Handbook of Meteorological Office*, London, 2: 45.

Graduation of Aneroids.—The height scales on aneroids designed for the use of travellers, are graduated on the assumption that the temperature of the atmosphere is constant and independent of the altitude. Various standard temperatures, such as 50°F and 0°C have been used. For such scales, especially when applied to aircraft use, the difference between the indicated and the true height may be excessive.

The International Commission for Aerial Navigation adopted in 1925 a scale based on the following conventions (*cf.* Dict. Applied Physics 3: 182): (a) Pressure at sea-level is $A_n = 1.0132 \times 10^6$ dynes/cm²; (b) temperature at sea-level is 15°C; (c) temperature decreases by 6.5°C per km, up to 11 km; and above 11 km is constant at -56.5°C; (d) humidity may be ignored; (e) value of g is same at all heights and = g_{45} (essentially g_s). Whence, denoting the pressure and density at sea-level by B_1 , and d_1 ; those at 11 000 m by $B_{11\ 000}$ and $d_{11\ 000}$:

$$\frac{B}{B_1} = \left(\frac{288 - 0.0065 H}{288} \right)^{5.256}; \quad \frac{d}{d_1} = \left(\frac{288 - 0.0065 H}{288} \right)^{4.256};$$

if $H > 11\ 000$ m.

$$\log_{10} \frac{B_{11\ 000}}{B} = \log_{10} \frac{d_{11\ 000}}{d} = \frac{H - 11\ 000}{14\ 600}, \text{ if } H > 11\ 000 \text{ m}$$

	Unit	Value	Log ₁₀
B_1	mm	760	2.88081
B_1	kilodyne/cm ²	1013.2	3.00570
d_1	g/m ³	1226	3.08849
$B_{11\ 000}$	mm	169.6	2.22943
$B_{11\ 000}$	kilodyne/cm ²	226.1	2.35432
$d_{11\ 000}$	g/m ³	364	2.56104

As the regulations drawn up by the I. C. A. N. are ambiguous, attention must be drawn to the fact that whilst the altimeter reading, H , gives the pressure uniquely, it cannot give the temperature and density of the air. Hence the formulae for d are on quite a different footing from those for B . (*Cf.* Section on Aerodynamics, Ed.)

VOLUMES OF LIQUID MENISCI

F. A. GOULD

As used in this section, the volume (V_m) of the liquid meniscus in a vertical, circular cylinder = volume of the liquid which lies below the capillary surface and between two horizontal planes, one tangent to the meniscus, and the other passing through the line in which the meniscus meets the wall of the tube. The value of V_m depends upon the surface tension (γ), the acceleration of gravity (g), the difference (ρ) in the densities of the fluids separated by the surface, the radius (r) of the cylinder, and the angle (θ) at which the capillary surface meets the wall of the cylinder. If θ is variable and not too small, it is more convenient to use the height (h_m) of the meniscus (= distance between the planes mentioned), than θ , as one of the variables. This has been done in Tables 1 and 2, which give the volume of the mercury meniscus for $\gamma = 400$ mg wt./cm (= 392.27 dynes/cm, $g = 980.665$), $\rho =$

13.55g/cm³. This value of γ is close to the mean of the values corresponding to the experimental determinations of V_m by Scheel and Heuse (8, 33: 295; 10) (425 mg/cm), and by Palacios (139, 17: 295; 19. 63, 24: 152; 23) (406 to 326 mg/cm); an idea of the error which is associated with a departure of the actual value of γ from that assumed may be obtained by comparing their values with those here given. (*See also* Schalkwijk, 168, No. 67, and 64 V, 8: 462; 00. 9: 512; 01.)

If $\theta = 0$, it is convenient to tabulate the dimensionless quantities V_m/r^3 and $h_c/r = V_m/\pi r^3$ as functions of $g\rho r^3/\gamma$, as is done in Table 3. [$g\rho r^3/\gamma = r^2/a_1^2$, where a_1 is capillary constant (British usage), *see* section Technical Terms (p. 34); h_c = length of circular cylinder of radius r and volume V_m .]

TABLE 1.—VOLUME (V_m) OF MERCURY MENISCUS

h_m = height of meniscus, d = internal diameter of tube. Accuracy for the larger menisci = 0.3%, for the smaller = 1%. Unit of V_m = 0.001 cm³; of h_m and d = 1 mm. Assumes $\gamma = 400$ mg wt./cm

h_m	d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d	h_m
0.1	0.040	0.159	0.360	0.646	1.02	1.50	2.08	2.75	3.55	4.46	5.49	6.67	7.97	9.42	11.1	12.8	14.8	16.9	19.2	21.6	24.2	27.0	30.0	33.1			0.1
0.2	0.083	0.321	0.723	1.30	2.05	3.00	4.16	5.53	7.12	8.95	11.0	13.4	16.0	18.9	22.2	25.7	29.6	33.9	38.5	43.4	48.6	54.1	60.0	66.3			0.2
0.3	0.134	0.490	1.09	1.95	3.09	4.52	6.26	8.32	10.7	13.5	16.6	20.2	24.1	28.5	33.4	38.7	44.6	51.0	57.8	65.2	73.0	81.3	90.2	99.6			0.3
0.4	0.195	0.669	1.47	2.63	4.14	6.04	8.37	11.1	14.3	18.0	22.3	27.0	32.3	38.1	44.7	51.8	59.6	68.1	77.3	87.1	97.5	109	120	133			0.4
0.5		0.861	1.87	3.31	5.21	7.59	10.5	14.0	18.0	22.7	28.0	33.9	40.6	47.9	56.1	65.0	74.7	85.4	96.9	109	122	136	151	167			0.5
0.6			1.07	2.29	4.01	6.30	9.16	12.7	16.8	21.7	27.3	33.7	40.9	48.9	57.8	67.6	78.3	90.0	103	117	131	147	164	181	200		0.6
0.7			1.31	2.72	4.74	7.43	10.8	14.9	19.7	25.4	32.0	39.5	47.9	57.4	67.8	79.2	91.7	105	120	136	154	172	191	212	234		0.7
0.8			1.56	3.17	5.50	8.58	12.4	17.1	22.6	29.2	36.8	45.4	55.1	65.9	77.8	91.0	105	121	138	156	176	197	219	243	268		0.8
0.9			1.85	3.67	6.29	9.77	14.1	19.4	25.6	33.0	41.6	51.4	62.3	74.5	88.0	103	119	137	160	177	199	222	248	274	303		0.9
1.0				4.19	7.12	11.0	15.8	21.7	28.6	36.9	46.5	57.3	69.6	83.2	98.3	115	133	153	174	197	222	248	276	306	337		1.0
1.1				4.76	7.99	12.3	17.6	24.1	31.8	40.9	51.4	63.5	77.0	92.1	109	127	147	169	192	218	245	274	305	338	372		1.1
1.2				5.39	8.90	13.6	19.5	26.6	35.0	44.9	56.5	69.7	84.5	101	119	139	161	185	211	238	268	300	334	369	407		1.2
1.3				6.07	9.88	15.0	21.4	29.1	38.2	49.1	61.7	76.0	92.1	110	130	152	176	201	229	260	292	326	363	402	443		1.3
1.4					10.9	16.4	23.4	31.7	41.7	53.3	66.9	82.4	99.9	119	141	164	190	218	248	281	316	353	392	434	478		1.4
1.5					12.1	18.0	25.4	34.5	45.2	57.8	72.3	89.0	108	129	152	177	205	235	268	303	340	380	422	468	515		1.5
1.6					13.3	19.6	27.6	37.3	48.8	62.3	77.8	95.7	116	138	163	190	220	253	287	325	365	407	453	501	552		1.6
1.7						21.4	29.8	40.2	52.6	67.0	83.6	103	124	148	175	204	236	270	307	347	390	436	484	535	589		1.7
1.8						23.2	32.2	43.3	56.4	71.7	89.5	110	133	158	186	218	251	288	328	370	415	464	515	570	628		1.8
1.9							34.8	46.5	60.4	76.7	95.5	117	141	168	199	232	268	306	349	393	441	493	547	605	666		1.9
2.0							37.4	49.8	64.6	81.9	102	124	150	179	211	246	284	325	370	417	468	522	580	641	706		2.0
2.1								53.4	69.1	87.3	108	132	159	190	224	261	301	344	391	441	495	552	614	678	746		2.1
2.2								73.7	93.0	115	140	169	201	237	276	318	364	413	466	523	583	648	716	787			2.2
2.3									98.9	122	149	179	213	250	291	336	384	436	492	552	615	683	754	829			2.3
2.4										130	158	189	225	264	307	354	405	459	518	581	648	719	794	872			2.4
2.5											167	200	237	279	324	373	427	484	546	612	681	755	833	915			2.5

TABLE 2.—HEIGHT (h_c) OF CYLINDER EQUIVALENT TO VOLUME (V_m) OF MERCURY MENISCUS

$h_c = V_m/\pi r^2$ = length of tube of radius r and volume V_m ; h_m = height of meniscus; $d = 2r$ = diameter of tube. Accuracy and basis are same as for Table 1

Unit of h_c , h_m , and d = 1 mm. Assumes $\gamma = 400$ mg wt./cm

h_m	d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d	h_m
0.1		0.0510	0.0510	0.0510	0.0510	0.0520	0.0530	0.0540	0.0550	0.0560	0.0570	0.0580	0.0590	0.0600	0.0610	0.0630	0.0640	0.0650	0.0660	0.0680	0.0690	0.0700	0.0710	0.0720	0.073	0.1	
0.2		0.1060	0.1020	0.1020	0.1030	0.1040	0.1060	0.1080	0.1100	0.1120	0.1140	0.1160	0.1180	0.1210	0.1230	0.1260	0.1280	0.1310	0.1330	0.1360	0.1380	0.1400	0.1420	0.1440	0.147	0.2	
0.3		0.1710	0.1560	0.1550	0.1550	0.1570	0.1600	0.1630	0.1650	0.1680	0.1720	0.1750	0.1780	0.1820	0.1850	0.1890	0.1920	0.1960	0.2000	0.2040	0.2080	0.2110	0.2140	0.2170	0.220	0.3	
0.4		0.2480	0.2130	0.2090	0.2090	0.2110	0.2140	0.2180	0.2210	0.2250	0.2300	0.2340	0.2390	0.2430	0.2480	0.2530	0.2570	0.2630	0.2680	0.2730	0.2770	0.2810	0.2860	0.2900	0.294	0.4	
0.5		0.2740	0.2650	0.2630	0.2650	0.2680	0.2730	0.2780	0.2830	0.2880	0.2940	0.3000	0.3060	0.3110	0.3180	0.3230	0.3290	0.3360	0.3420	0.3480	0.3530	0.3580	0.3630	0.368	0.5		
0.6		0.3410	0.3230	0.3190	0.3210	0.3240	0.3290	0.3350	0.3410	0.3480	0.3550	0.3620	0.3680	0.3750	0.3830	0.3890	0.3970	0.4040	0.4110	0.4180	0.4240	0.4300	0.4370	0.443	0.6		
0.7		0.4160	0.3850	0.3770	0.3780	0.3810	0.3860	0.3920	0.4000	0.4080	0.4160	0.4240	0.4320	0.4400	0.4480	0.4560	0.4650	0.4730	0.4810	0.4890	0.4960	0.5040	0.5110	0.518	0.7		
0.8		0.4970	0.4490	0.4380	0.4370	0.4400	0.4440	0.4500	0.4590	0.4680	0.4780	0.4870	0.4960	0.5060	0.5150	0.5240	0.5330	0.5420	0.5510	0.5610	0.5690	0.5770	0.5850	0.593	0.8		
0.9		0.5880	0.5190	0.5010	0.4970	0.4990	0.5030	0.5100	0.5190	0.5300	0.5400	0.5510	0.5610	0.5720	0.5820	0.5920	0.6020	0.6130	0.6230	0.6330	0.6420	0.6510	0.6600	0.669	0.9		
1.0		0.5930	0.5670	0.5590	0.5600	0.5630	0.5700	0.5800	0.5920	0.6040	0.6150	0.6270	0.6380	0.6500	0.6610	0.6730	0.6840	0.6950	0.7060	0.7160	0.7260	0.7360	0.746	1.0			
1.1		0.6740	0.6360	0.6240	0.6230	0.6260	0.6320	0.6430	0.6550	0.6680	0.6810	0.6940	0.7060	0.7190	0.7310	0.7430	0.7560	0.7670	0.7790	0.7900	0.8020	0.8120	0.823	1.1			
1.2		0.7620	0.7080	0.6920	0.6890	0.6910	0.6960	0.7070	0.7200	0.7330	0.7470	0.7610	0.7750	0.7880	0.8020	0.8150	0.8280	0.8410	0.8540	0.8660	0.8780	0.8890	0.900	1.2			
1.3		0.8590	0.7860	0.7630	0.7560	0.7570	0.7610	0.7720	0.7850	0.7990	0.8150	0.8290	0.8440	0.8590	0.8730	0.8870	0.9020	0.9150	0.9290	0.9420	0.9550	0.9670	0.979	1.3			
1.4		0.8960	0.8370	0.8260	0.8250	0.8290	0.8390	0.8520	0.8670	0.8830	0.8990	0.9150	0.9300	0.9460	0.9610	0.9760	0.9910	1.01	1.02	1.03	1.05	1.06	1.4				
1.5		0.9610	0.9150	0.8990	0.8960	0.9000	0.9080	0.9210	0.9360	0.9530	0.9690	0.9860	1.00	1.02	1.04	1.05	1.07	1.08	1.10	1.11	1.13	1.14	1.5				
1.6		1.06	1.00	0.9760	0.9690	0.9720	0.9800	0.9910	1.01	1.02	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.6				
1.7		1.09	1.06	1.04	1.05	1.05	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.32	1.34	1.36	1.37	1.7		
1.8		1.18	1.14	1.12	1.12	1.13	1.14	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.40	1.42	1.44	1.46	1.47	1.8	
1.9		1.23	1.21	1.20	1.21	1.22	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.54	1.56	1.9		
2.0		1.32	1.30	1.29	1.29	1.30	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.50	1.52	1.54	1.56	1.58	1.59	1.61	1.63	1.65	2.0		
2.1		1.39	1.37	1.37	1.38	1.39	1.41	1.43	1.45	1.47	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	2.1			
2.2		1.47	1.46	1.47	1.48	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	1.76	1.78	1.80	1.82	1.83	2.2			
2.3		1.55	1.56	1.57	1.58	1.60	1.63	1.65	1.67	1.69	1.71	1.73	1.76	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.93	2.3					
2.4		1.65	1.66	1.68	1.69	1.72	1.74	1.76	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.93	1.95	1.97	1.99	2.01	2.02	2.4					
2.5		1.76	1.77	1.79	1.81	1.83	1.86	1.88	1.90	1.92	1.95	1.97	1.99	2.01	2.02	2.5											

TABLE 3.—VOLUME (V_m) OF LIQUID MENISCUS, $\theta = 0$

(Meniscus concave upwards)

As quantities tabulated are dimensionless, any consistent system of units may be used. g = acceleration of gravity, r = radius of tube, h_c = length of tube of radius r and volume V_m . (Computed from tables of Bashforth and Adams as given in their "Capillary Action.")

$g\rho r^2/\gamma$	V_m/r^3	h_c/r	$g\rho r^2/\gamma$	V_m/r^3	h_c/r
0	1.048	0.333	4.0	0.649	0.206
0.1	1.029	0.327	4.5	0.623	0.198
0.2	1.010	0.321	5.0	0.599	0.190
0.4	0.978	0.311	5.5	0.578	0.184
0.6	0.947	0.301	6.0	0.557	0.177
0.8	0.919	0.292	6.5	0.537	0.171
1.0	0.894	0.284	7.0	0.518	0.165
1.5	0.837	0.266	7.5	0.501	0.159
2.0	0.789	0.251	8.0	0.484	0.1540
2.5	0.747	0.238	8.5	0.470	0.1493
3.0	0.711	0.226	9.0	0.456	0.1449
3.5	0.678	0.216	9.5	0.442	0.1406
			10.0	0.429	0.1365

Example 1: A gas is collected in a eudiometer over mercury. The volume to the plane through the line of contact of the mercury with the wall of the tube = V_o . If this portion of the eudiometer is a vertical, circular cylinder of diameter $d = 10$ mm, and if height of meniscus is $h_m = 1.5$ mm, then $V_m = 0.0723$ cm³ (Table 1), and the actual volume of the gas is $V = V_o - 0.072$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading at the line of contact is h_o , and if $d = 10$ mm, $h_m = 1.5$ mm, then $h_c = 0.921$ mm (Table 2), and the actual volume of the gas corresponds to $h_o - h_c = h_o - 0.921$ mm.

Example 2: A gas is collected in a eudiometer over water. The volume to the plane tangent to the bottom of the meniscus = V_o . If this portion of the eudiometer is a vertical, circular cylinder of radius $r = 0.5$ cm, if $\gamma = 73$ dynes/cm, $g = 980.7$ cm/sec², $\rho = 1.000$, and $\theta = 0$ (the tube is perfectly wetted by the water), then $g\rho/\gamma = 13.43$ cm⁻², $g\rho r^2/\gamma = 3.36$. Hence $V_m/r^3 = 0.689$ (Table 3), and $V_m = 0.086$ cm³. Hence the actual volume of the gas is $V_o - V_m = V_o - 0.086$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading corresponding to the bottom of the meniscus is h_o , then for $g\rho r^2/\gamma = 3.36$, $h_c/r = 0.219$ (Table 3), and if $r = 5$ mm, $h_c = 1.10$ mm, and the actual volume of the gas corresponds to $h_o - h_c = h_o - 1.10$ mm.

WEIGHTS AND WEIGHING

A. T. PIENKOWSKY

In this section are considered:—(A) Weights—the basis upon which they are adjusted or tested, and their constancy; (B) the correcting of weighings for the buoyant effect of the air, including the weighing of substances in containers; and (C) the correcting of density determinations for the buoyant effect of the air.

WEIGHTS

Basis of Adjustment.—Most weights are adjusted by the maker according to their apparent weight in air against brass standards. This is equivalent to adjusting brass weights according to their real mass (or "weight in vacuo"), but the true mass values of other

weights (e.g., those of platinum, aluminum, or quartz) may be much different from their nominal values. When a set of weights is calibrated, however, the values found may be either true mass or apparent values, depending on the standard used and the method of conducting the test. Certificates from different standardizing laboratories may give values on either basis, or on both.

"Weight in Air against Brass."—Commercial weighing is all based on apparent weight in air against brass standards, this basis being more or less accurately defined in some countries. Precise scientific weighing is based on true mass values (i.e., on "weight in vacuo"), but weights below one gram may be tested and used as if they were of brass, even for work of rather high precision. In so testing these weights, their apparent "values" are computed on the assumption that their density is Δ_s = density of brass (generally Δ_s is taken as 8.4 g per cm³); and in using them the apparent values so found are used as though they were the true masses of the weights, Δ_s being at the same time used just as though it were the true density of the weights. In such cases the error ($m_f - m$) so introduced, arises solely from the fact that the density (σ_1) of the air at the time the values of the weights were determined differs from that (σ) at the time they were used in weighing the object. This error is given approximately by equation (1) in which m is the correct, and m_f is the false mass, s is the nominal value of the weight, Δ_s is the density assumed for brass weights and Δ the actual density of the weights used.

$$m_f - m = s \left(\frac{1}{\Delta_s} - \frac{1}{\Delta} \right) (\sigma_1 - \sigma) \quad (1)$$

Example: If the value of a platinum 500 mg weight ($\Delta = 21.5$ g/cm³) is determined according to "weight in air against brass" ($\Delta_s = 8.4$ g/cm³) at sea level ($\sigma_1 = 0.0012$ g/cm³), and this value is used at an altitude of 5000 ft. ($\sigma = 0.0010$ g/cm³) the error in the mass of a body as so weighed will be $m_f - m = 0.007$ mg.

"Apparent" densities or specific gravities determined according to apparent "weight in air against brass" are subject not merely to variations in the density of the air, but also to differences in experimental technique (see p. 78 to 80).

Constancy.—Data on changes in weights can indicate only the order of magnitude of such changes, and as a rule can show only what *may* happen, since such changes are extremely irregular.

Ordinary brass weights with knobs screwed in (whether gold plated, platinum plated, or lacquered) may continue to gain in weight for many years, and may do so without developing any visible signs of such change. The following examples are typical of extreme changes that sometimes occur. Larger changes have been recorded.

Denomination...	g	100	50	20	10	5	2	1
Gain in 6 yr....	mg	1.7	1.2	0.8	0.7	0.6	0.8	0.3
Gain in 14 yr....	mg	3.3	3.9	1.8	2.5	0.8	0.3	1.1

The following is typical of what has often happened when new weights were not used and were carefully protected.

Denomination...	g	100	50	20	10	5	2	1
Gain in 5 mo....	mg	0.1	0.1	0.0	0.1	0.1	0.0	0.0
Gain in 1 yr....	mg	0.2	0.1	0.0	0.0	0.1	0.0	0.0

Lacquered weights of good quality are less subject to spotting and general surface tarnishing than are the gold or platinum plated weights often sold. Lacquered weights, however, are subject to rapid variations caused by changes in the relative humidity of the air. Lacquered weights of about 20 to 100 g may be expected to vary 0.1 or 0.2 mg with large variations in humidity. Changes of over 0.5 mg have been recorded.

Sets of weights of the ordinary type may, however, be very constant. For example, one set was used for over a year with changes less than 0.02 mg and few changes over half that amount; and two sets were used occasionally for 17 and 18 yr, respectively, with no changes over 0.2 mg.

For reference standards, one-piece weights are very much more reliable than the common screw-knob type. The following changes in a high grade, gold plated, bronze set of this type are typical for weights used little and with great care. Positive changes are gains, negative changes losses.

Denomination.....	g	50	20	20	10	5	2	2	1
Changes in 15 yr..	mg	-0.12	0.00	0.02	-0.01	-0.006	0.001	0.008	-0.007

Solid platinum or platinum-iridium weights of moderate size may be expected to remain constant within about 0.01 mg if handled with sufficient care and protected from dust and other deposits. The sheet metal weights below one g are not much more constant than this; very good weights kept with extreme care as reference standards may stay within 0.001 mg for some years, but this cannot safely be assumed. If these small weights are much used, even with good care, losses of 0.01 mg may soon be expected in the larger ones.

CORRECTING OF WEIGHINGS FOR BUOYANT EFFECT OF THE AIR

("Reduction of Weighings to Vacuo")

In addition to a sufficiently sensitive balance, accurate weighing requires (1) that the balance itself maintain a sufficiently constant zero point and ratio of arms of the beam; (2) that the effect of inequality of the arms of the beam be eliminated by the method of weighing, since it cannot as a rule be corrected for with sufficient accuracy; (3) that the object and the weights have definite constant values, free from such effects as variable surface films, evaporation, magnetic attractions, etc.; (4) that surrounding conditions be maintained free from sources of disturbance and error, such as electrostatic attractions, convection currents, variable or unsymmetrical heat radiations, etc.; and (5) that proper correction be made for the buoyant effect of the air.

The first four types of requirements are matters of technique, and no general methods of correction can be used for errors arising from them. They are therefore outside the scope of these tables.

The fifth requirement demands definite formulae and facts, some of the most fundamental or general of which are given below.

The phrase "apparent weight" is commonly used for the result of a weighing in which no correction has been made for the buoyant effect of the air. The phrase is ambiguous¹ and often leads to a confusion of ideas. Therefore this term is not used in the equations of this section, but reference is made directly to the weights that would be used on an equal-arm balance to make the weighings. The phrase "weights needed" must be understood to include the proper fraction of the rider or other small weights needed to make up the total amount; and it refers to *actual* values of the weights, which may or may not equal the nominal values marked on them.

Symbols.—

- a* mass of the contents of the "empty" portions of the container.
(In weighing gases *a* is zero. In weighing solids or liquids it may be the mass of air or of vapor of the solid or liquid. In weighing a pycnometer with the liquid which fills it at a temperature different from that at which it is weighed, the volume occupied by *a* results from the unequal expansion of pycnometer and liquid)
- b* $(v_s - v_c)/v_s$. Relative size of the container and its counterpoise
- c* mass of counterpoise
- k* buoyancy reduction factor
- l* mass of liquid that fills the pycnometer at the established filling temperature
- m* mass of object; in general or where its volume is not fixed by the volume of a pycnometer
- p* mass of pycnometer or other container
- r* error resulting from use of approximate buoyancy formula

¹ Compare equations (8) and (9); in each case $s'' - s'$ would be called the apparent weight, but its value in (9) is v_{ms} greater than in (8).

- s** mass of weights needed on an equal arm balance, whether with or without special counterpoise, to balance the objects being weighed. (Regarding use of other than true mass values, see p. 73)
- s.** $s - v\sigma = s(1 - \sigma/\Delta)$. This is *not* "weight in vacuo" as that phrase is often used
- t** temperature. If accented it is the temperature at the time of the indicated weighing; if unaccented, it is the temperature at which the pycnometer is filled. In so far as their temperatures have any effect upon the operation considered, all objects (*e.g.*, the balance, its loads, and the surrounding air) are assumed to be at the same temperature
- v** volume or capacity; when without subscript it is capacity of the container at time of weighing; with one of the subscripts *a*, *c*, *l*, *m*, *p*, *s*, or *w*, it is volume of the object whose mass is indicated by the subscript (*e.g.*, v_m = volume of the object whose mass is *m*)
- v_i** capacity of the pycnometer at the temperature of filling
- v_p** volume of the pycnometer itself, excluding the space that would be filled by liquid at the temperature of filling. (Ordinarily v_p = volume of the material of which the pycnometer is constructed)
- v_e** "exterior volume" of the pycnometer or other container. With pycnometers, at temperature of filling, $v_e = v_p + v_i$; at another temperature, $v'_e, v''_e, v_p'' + v'' = v_p' + v_m'' + v_e''$
- w** mass of the calibrating liquid (*e.g.*, water) which is used to determine a volume or to serve as a standard of density
- β** cubical coefficient of thermal expansion
- Δ** density of the weights at the time of weighing
- σ** density of the air at the time of weighing
- ρ** density of object being studied or of calibrating liquid. If accented it is density at time of weighing; if unaccented it is density at temperature (*t*) at which the pycnometer was filled

Density is true mass per unit of volume.

Accents denote the weighing to which the quantity applies. In general ' denotes the weighing of the object alone or of the container; '' denotes the weighing of the combined container and object studied, or of the container filled with the calibrating liquid or of the object suspended in the calibrating liquid; ''' denotes the weighing of the pycnometer "filled" with liquid to be studied, or "filled" with object studied plus calibrating liquid.

Subscripts.—*f* denotes false or erroneous values. For *s*, see above (*s*, and *v_e*). Other subscripts indicate the object to which the quantity applies; *e.g.*, ρ_a = density of material whose mass is *a*.

Fundamental Exact Equation.—The use of the direct, fundamental, exact equation (2) avoids many complications and approximations introduced by most formulae based on densities.

$$m = s + (v_m - v_e)\sigma \quad (2)$$

The equation using densities, in one of the exact forms (3) given below, is useful chiefly for computing exact tables, or the effect of errors, approximations, etc. As a rule, either the densities are not known well enough to warrant its use, or the volumes involved will have been measured, thus going back to equation (2).

$$m = s \left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_m}} \right) = s \frac{\rho_m(\Delta - \sigma)}{\Delta(\rho_m - \sigma)} = s \left\{ 1 + \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)} \right\} = s + s \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)} \quad (3)$$

In the last form of (3), the second term is the exact "buoyancy correction term," and in this correction term the factor (fraction) by which *s* is multiplied is the exact "buoyancy reduction factor" (*k*). See Tables 2 and 3.

Common Equation Using Densities.—Some form of equation (4) is commonly used for reducing weighings. This equation is not exact. It is entirely inapplicable to weighing gases, but is amply accurate for much work with solids and liquids.

$$m = s + s\sigma \left(\frac{1}{\rho_m} - \frac{1}{\Delta} \right) \quad (4)$$

The factor $\sigma \left(\frac{1}{\rho_m} - \frac{1}{\Delta} \right)$ is the "buoyancy reduction factor" commonly given. When the densities lie between 0.5 and 21.5 g per cm³, and are known with sufficient accuracy, the error (*r*) introduced by the use of this formula does not exceed one part in 100 000 of the mass of the object weighed. Its value, and that of the proportional error ($r' = r/s$) may be calculated by formula (5); their orders of magnitude may readily be determined from Table 1, which is based on $\sigma = 0.0012$ g/cm³.

$$r' = \frac{r}{s} = \frac{\sigma^2(\Delta - \rho_m)}{\Delta\rho_m(\rho_m - \sigma)} \quad (5)$$

TABLE 1

Unit of Density is g/cm³

ρ_m	100 r'		
	$\Delta = 21.5$	$\Delta = 8.4$	$\Delta = 2.65$
1.00	0.0001	0.0001	0.0001
0.5	0.0006	0.0005	0.0005
0.05	0.06	0.06	0.06
0.005	8.	8.	7.

Density of the Air.—Variations in the density of the air under standard conditions,¹ as well as the uncertainties of its experimental determination, limit the precision with which very large or extremely precise buoyancy corrections can be calculated from tables of air density. The former seems at present to be the larger, and therefore sets a fixed limit which can be exceeded only by eliminating or reducing the size of the correction, or by making an experimental determination of the density of the air at the time of the weighing. These limiting uncertainties are of the order of 5 in 10⁴ and affect the total buoyancy correction in the same ratio. Since they affect only the fourth significant figure in the buoyancy reduction factor they are negligible in the use of Tables 2 and 3.

In weighing gases, the density of the air must be found from precise tables (consult index). When the volume of the gas is not compensated by a counterpoise of the same size, the density of the air must be known with approximately the same precision as is desired for that of the gas; when it is so compensated, the buoyancy correction is generally the total buoyancy on the weights, and therefore is still relatively large.

For most work with solids and liquids an approximate value of the density of the air is sufficient. The precision to which it must be known can be found from an examination of Table 2. It should be noted that a precision of 1 in 10⁴ in the mass to be determined requires a precision of 1 in the *n*'th decimal place of the buoyancy reduction factor (*i.e.*, in the actual factor *k*, not in the printed value of 1000*k*). In getting the buoyancy reduction factor from Table 2, and in similar work, to a precision not greater than one in about 10³, the density of the air may be found from the "Air Density Chart," Fig. 1.

The precision to which temperature, pressure, and humidity must be known in order to find the density of the air to the necessary precision, may be inferred from Fig. 1, except in the case of very large corrections, or of corrections to be determined with extreme precision. In the latter cases this information must be sought in other places.

Density of the Weights.—If the density of the air in which the weights are used is the same as that in which their values were determined, errors in the density assumed for the weights will have

¹ Treuthart, 34, 172: 1598; 21. Moles, 34, 172: 1600; 21.

no effect on the accuracy with which the mass of the object may be determined, provided the same density that was assumed for them in determining their values is assumed for them when they are used. It is not necessary, therefore, to know the density of the weights as accurately as that of the object weighed.

If weights are used in air whose density differs by not more than 20% from that of the air in which their values were determined, the amount by which the density of ordinary weights is likely to differ from the values used in Tables 2 and 3 will not cause errors greater than one part in about 100,000 in the determination of the mass of the object weighed; provided that the density used in determining the value of the weight is the same as that used in the computation of the mass.

For a precision above one part in a million, it is frequently necessary to measure the volume or density of each weight.

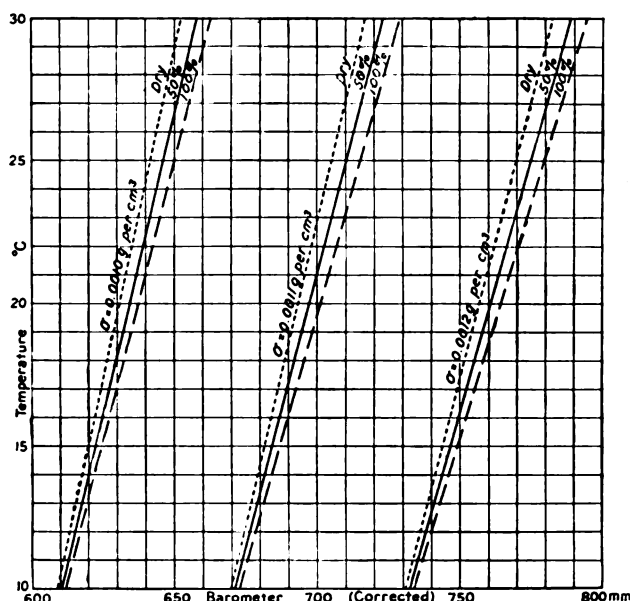


FIG. 1.—Air density chart. (For use with Tables 2 and 3.)

Ordinary two-piece weights are not used for such work because they cannot safely be put into liquids for hydrostatic weighing.

Aluminum is not used for weights above 0.02 g in high quality weights, nor above 0.5 g in second quality sets. When the values of such weights have been determined on the assumption of a density of 2.7 g per cm^3 at 0°C , the use of the buoyancy reduction factors given for quartz in Table 2 introduces an error in the mass of the object weighed, of less than 0.0002 mg for amounts up to 0.02 g, and of less than 0.005 mg for amounts up to 0.5 g.

The densities of most gold alloys used for weights lie between 16 and 18 g per cm^3 . For gold within this range, the use of the factors given in Tables 2 and 3 will not introduce errors greater than one part in 200,000, or not over 0.005 mg in weighing amounts under one g.

In Tables 2 and 3, the densities used for weights of platinum or platinum-iridium, for those of brass or bronze, and for those of aluminum, are those which were adopted many years ago for certifying weights at the National Bureau of Standards of the United States of America, and were assumed as the densities at 0°C . The following coefficients of cubical expansion are assumed in reducing the volumes of such weights to the volumes at 20°C .

Platinum and Platinum-iridium.....	0.000 026 per deg. C
Brass or bronze.....	0.000 054 per deg. C
Aluminum.....	0.000 069 per deg. C

The densities of gold and of crystal quartz are assumed as the densities at 20°C . All buoyancy reduction factors are based on differences in volume at 20°C .

Density of Object Weighed.—A change of one in 10^4 of the mass of the object corresponds to a change of one in the n 'th decimal place of the buoyancy reduction factor. Therefore, to the precision obtainable by the use of Table 2, the precision required in the density of the object may be found by noting in that table what change in density (at approximately the density under consideration) corresponds to the allowable variation in the buoyancy reduction factor.

The use of "standard" or "adopted" densities for the object weighed may give an accuracy which is entirely fictitious. There is no compensation as in the case of weights, and the actual error or uncertainty in the density of the particular object weighed has its full effect in the error or uncertainty of the calculated mass.

A fictitious "apparent" density derived from weighings uncorrected for buoyancy of the air must be corrected to true density before being inserted in the formulae given in this section unless only an approximate value of density is needed (see p. 78).

Temperature of Objects and Weights.—In weighing gases, and to secure the highest precision in many other cases, it is necessary to compute all volumes or densities at the actual temperature of the observations, unless the coefficient of expansion of the object happens to be nearly the same as that of the weights. If the temperature is entirely neglected, and weighings are made at room temperatures, the extreme error likely to be introduced in the mass calculated for solids and liquids is less than three in 10^4 . (This would be the error for material having a density of 0.2 g per cm^3 at 0°C , and a coefficient of cubical expansion of 1.6×10^3 , when compared with weights whose actual volumes or densities are those used in the calculation.)

Example 1: The actual mass of the weights used was $s = 10.0105$ g; the corrected barometric height was 758 mm; air temperature, 19.6°C ; relative humidity 25%; density of object 3.5 g/ cm^3 ; weights were of brass.

Referring to Fig. 1, the air density corresponding to these conditions is seen to be close to 0.0012 g/ cm^3 . Entering Table 2 with $\rho_m = 3.5$ and the column for brass weights, under $1000\sigma = 1.2$, it is found that $1000k$ is 0.20; hence the mass of the object is $m = s + ks = 10.0105 + 0.00020 \times 10.0105 = 10.0105 + 0.0020 = 10.0125$ g.

Example 2: The factor for $\rho_m = 3.0$ differs by 6 in the fifth decimal place from that for $\rho_m = 3.5$. The error in mass produced by using 3.0 in place of 3.5 as the density of the object is therefore 6 parts in 10^4 . For the object in Example 1 this would be an error of 0.0006 g. Similarly the use of 7.0 instead of 7.5 for ρ_m would produce an error of about one part in 10^4 in the mass of the object.

Example 3: In Fig. 1 the point corresponding to barometric height 720 mm, air temperature 21°C , and relative humidity 50%, lies to the right of the line for 0.0011 g/ cm^3 , 50%, by $1\frac{1}{2}\%$ of the distance between the 0.0011 and the 0.0012 lines. Hence, $\sigma = 0.0011 + 0.0001 \times 1\frac{1}{2}\% = 0.001131$ g/ cm^3 . (For most work for which Table 2 is suited the density can be estimated by eye with sufficient accuracy; as in this case, 0.00113 g/ cm^3 .) The factor from Table 2 may then be found either by multiplying the factor for $1000\sigma = 1.0$ by 1.13 or by interpolating between the factor for $1000\sigma = 1.1$ and that for $1000\sigma = 1.2$. For brass weights and $\rho_m = 3.5$ the former gives $0.17 \times 1.13 = 0.192$ as the value of $1000k$. A calculated interpolation between 0.18 and 0.20 gives 0.186, which agrees with the other value within the accuracy of such tabular interpolations.

Weighing Objects in Containers.—Two weighings are required; one of the container alone and the other with the object in the

TABLE 2.—BUOYANCY REDUCTION FACTOR (k)

$$m = s + ks, \text{ where } k = \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)}$$

(Cf. equation (3). Symbols, p. 74.) Unit of density is g/cm³ or, to precision of this table, g/ml

Density of object weighed ρ_m	1000 k											
	$\Delta = 21.5$ Pt or Pt-Ir			$\Delta = 17$ Gold			$\Delta = 8.4$ Brass or bronze			$\Delta = 2.65$ Crystal quartz or aluminum*		
	1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$		
	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2
0.2	4.98	5.48	5.98	4.97	5.47	5.97	4.91	5.40	5.89	4.65	5.11	5.58
0.3	3.30	3.63	3.96	3.29	3.62	3.95	3.22	3.55	3.87	2.97	3.26	3.56
0.4	2.46	2.71	2.95	2.45	2.69	2.94	2.39	2.63	2.87	2.13	2.34	2.55
0.5	1.96	2.15	2.35	1.95	2.14	2.34	1.88	2.07	2.26	1.63	1.79	1.95
0.6	1.62	1.79	1.95	1.61	1.77	1.93	1.55	1.71	1.86	1.29	1.42	1.55
0.7	1.38	1.52	1.66	1.37	1.51	1.65	1.31	1.44	1.57	1.05	1.16	1.26
0.75	1.29	1.42	1.55	1.28	1.40	1.53	1.22	1.34	1.46	0.96	1.05	1.15
0.80	1.20	1.33	1.45	1.19	1.31	1.43	1.13	1.25	1.36	0.87	0.96	1.05
0.82	1.17	1.29	1.41	1.16	1.28	1.39	1.10	1.21	1.32	0.84	0.93	1.01
0.84	1.15	1.26	1.37	1.13	1.25	1.36	1.07	1.18	1.29	0.81	0.90	0.98
0.86	1.12	1.23	1.34	1.11	1.22	1.33	1.04	1.15	1.25	0.79	0.86	0.94
0.88	1.09	1.20	1.31	1.08	1.19	1.29	1.02	1.12	1.22	0.76	0.83	0.91
0.90	1.07	1.17	1.28	1.05	1.16	1.26	0.99	1.09	1.19	0.73	0.81	0.88
0.91	1.05	1.16	1.26	1.04	1.15	1.25	0.98	1.08	1.18	0.72	0.79	0.87
0.92	1.04	1.15	1.25	1.03	1.13	1.24	0.97	1.06	1.16	0.71	0.78	0.85
0.93	1.03	1.13	1.24	1.02	1.12	1.22	0.96	1.05	1.15	0.70	0.77	0.84
0.94	1.02	1.12	1.22	1.01	1.11	1.21	0.95	1.04	1.13	0.69	0.76	0.82
0.95	1.01	1.11	1.21	0.99	1.09	1.19	0.93	1.03	1.12	0.68	0.74	0.81
0.96	1.00	1.10	1.20	0.98	1.08	1.18	0.92	1.02	1.11	0.67	0.73	0.80
0.97	0.99	1.08	1.18	0.97	1.07	1.17	0.91	1.00	1.09	0.65	0.72	0.79
0.98	0.97	1.07	1.17	0.96	1.06	1.16	0.90	0.99	1.08	0.64	0.71	0.77
0.99	0.96	1.06	1.16	0.95	1.05	1.14	0.89	0.98	1.07	0.63	0.70	0.76
1.00	0.95	1.05	1.15	0.94	1.04	1.13	0.88	0.97	1.06	0.62	0.69	0.75
1.01	0.94	1.04	1.13	0.93	1.03	1.12	0.87	0.96	1.05	0.61	0.67	0.74
1.02	0.93	1.03	1.12	0.92	1.01	1.11	0.86	0.95	1.03	0.60	0.66	0.72
1.03	0.93	1.02	1.11	0.91	1.00	1.10	0.85	0.94	1.02	0.59	0.65	0.71
1.04	0.92	1.01	1.10	0.90	0.99	1.08	0.84	0.93	1.01	0.58	0.64	0.70
1.05	0.91	1.00	1.09	0.89	0.98	1.07	0.83	0.92	1.00	0.58	0.63	0.69
1.06	0.90	0.99	1.08	0.89	0.97	1.06	0.82	0.91	0.99	0.57	0.62	0.68
1.07	0.89	0.98	1.07	0.88	0.96	1.05	0.82	0.90	0.98	0.56	0.61	0.67
1.08	0.88	0.97	1.06	0.87	0.95	1.04	0.81	0.89	0.97	0.55	0.60	0.66
1.09	0.87	0.96	1.05	0.86	0.94	1.03	0.80	0.88	0.96	0.54	0.59	0.65
1.10	0.86	0.95	1.04	0.85	0.94	1.02	0.79	0.87	0.95	0.53	0.59	0.64
1.12	0.85	0.93	1.02	0.83	0.92	1.00	0.77	0.85	0.93	0.52	0.57	0.62
1.14	0.83	0.91	1.00	0.82	0.90	0.98	0.76	0.83	0.91	0.50	0.55	0.60
1.16	0.82	0.90	0.98	0.80	0.88	0.96	0.74	0.82	0.89	0.49	0.53	0.58
1.18	0.80	0.88	0.96	0.79	0.87	0.95	0.73	0.80	0.87	0.47	0.52	0.56
1.20	0.79	0.87	0.95	0.78	0.85	0.93	0.71	0.79	0.86	0.46	0.50	0.55
1.25	0.75	0.83	0.91	0.74	0.82	0.89	0.68	0.75	0.82	0.42	0.47	0.51
1.30	0.72	0.80	0.87	0.71	0.78	0.85	0.65	0.72	0.78	0.39	0.43	0.47
1.35	0.69	0.76	0.83	0.68	0.75	0.82	0.62	0.68	0.75	0.36	0.40	0.44
1.40	0.67	0.74	0.80	0.66	0.72	0.79	0.60	0.66	0.71	0.34	0.37	0.40
1.50	0.62	0.68	0.74	0.61	0.67	0.73	0.55	0.60	0.66	0.29	0.32	0.35
1.6	0.58	0.64	0.69	0.57	0.62	0.68	0.51	0.56	0.61	0.25	0.27	0.30
1.7	0.54	0.60	0.65	0.53	0.58	0.64	0.47	0.52	0.56	0.21	0.23	0.25
1.8	0.51	0.56	0.61	0.50	0.55	0.60	0.44	0.48	0.52	0.18	0.20	0.21
1.9	0.48	0.53	0.58	0.47	0.51	0.56	0.41	0.45	0.49	0.15	0.16	0.18
2.0	0.45	0.50	0.54	0.44	0.49	0.53	0.38	0.42	0.46	0.12	0.14	0.15
2.2	0.41	0.45	0.49	0.40	0.44	0.48	0.34	0.37	0.40	0.08	0.08	0.09
2.4	0.37	0.41	0.44	0.36	0.39	0.43	0.30	0.33	0.36	0.04	0.04	0.05
2.6	0.34	0.37	0.41	0.33	0.36	0.39	0.27	0.29	0.32	0.01	0.01	0.01
2.8	0.31	0.34	0.37	0.30	0.33	0.36	0.24	0.26	0.29	-0.02	-0.02	-0.02
3.0	0.29	0.32	0.34	0.27	0.30	0.33	0.21	0.24	0.26	-0.04	-0.05	-0.05
3.5	0.24	0.26	0.29	0.23	0.25	0.27	0.17	0.18	0.20	-0.09	-0.10	-0.11
4	0.20	0.22	0.24	0.19	0.21	0.23	0.13	0.14	0.16	-0.13	-0.14	-0.15
5	0.15	0.17	0.18	0.14	0.16	0.17	0.08	0.09	0.10	-0.18	-0.20	-0.21
6	0.12	0.13	0.14	0.11	0.12	0.13	0.05	0.05	0.06	-0.21	-0.23	-0.25
7	0.10	0.11	0.12	0.08	0.09	0.10	0.02	0.03	0.03	-0.23	-0.26	-0.28
8	0.08	0.09	0.09	0.07	0.07	0.08	0.01	0.01	0.01	-0.25	-0.28	-0.30
9	0.06	0.07	0.08	0.05	0.06	0.06	-0.01	-0.01	-0.01	-0.27	-0.29	-0.32
10	0.05	0.06	0.06	0.04	0.05	0.05	-0.02	-0.02	-0.02	-0.28	-0.31	-0.33
12	0.04	0.04	0.04	0.02	0.03	0.03	-0.04	-0.04	-0.04	-0.29	-0.32	-0.35
14	0.02	0.03	0.03	0.01	0.01	0.02	-0.05	-0.05	-0.06	-0.31	-0.34	-0.37
16	0.02	0.02	0.02	0.00	0.00	0.00	-0.06	-0.06	-0.07	-0.31	-0.35	-0.38
18	0.01	0.01	0.01	0.00	0.00	0.00	-0.06	-0.07	-0.08	-0.32	-0.35	-0.39
20	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.07	-0.08	-0.08	-0.33	-0.36	-0.39
22	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.07	-0.08	-0.09	-0.33	-0.37	-0.40

* See Density of Weights, p. 75.

container. The exact equations connecting the masses and corresponding to equation (2) are:

$$(p' + a') = (s' + c') + [v_s' - (v_s' + v_c')] \sigma'$$

and

$$(p'' + m + a'') = (s'' + c'') + [v_s'' - (v_s'' + v_c'')] \sigma''$$

Assuming p and c to be constant, as must generally be done, and subtracting, gives the general equation (6).

$$m = (s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_c'')] \sigma'' - [v_s' - (v_s' + v_c')] \sigma' \quad (6)$$

If also v_s , v_c , Δ and σ are the same for both weighings, which requires the same temperature and equivalent atmospheric conditions,

$$m = (s'' - s') - (a'' - a') - (v_s'' - v_s') \sigma \quad (7)$$

TABLE 3.—BUOYANCY REDUCTION FACTOR (k) FOR USE IN INTERCOMPARISON OF WEIGHTS
(For other factors and for symbols, see Table 2 and p. 74)

$$m = s + ks$$

$$\text{Unity of density} = \text{g/cm}^3$$

Density of weight tested ρ_m	1000k														
	$\Delta^* = 21.5$ Pt or Pt-Ir			$\Delta^\dagger = 17$ Gold			$\Delta^* = 8.4$ Brass or bronze			$\Delta^* = 2.7$ Aluminum			$\Delta^\dagger = 2.65$ Crystal quartz		
	1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$			1000 $\sigma =$		
	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2
21.5*	0.000	0.000	0.000	-0.012	-0.014	-0.015	-0.073	-0.080	-0.087	-0.324	-0.357	-0.389	-0.331	-0.364	-0.397
17†	0.012	0.014	0.015	0.000	0.000	0.000	-0.060	-0.066	-0.072	-0.312	-0.343	-0.374	-0.319	-0.350	-0.382
8.4*	0.073	0.080	0.087	+0.060	+0.066	+0.072	0.000	0.000	0.000	-0.252	-0.277	-0.302	-0.258	-0.284	-0.310
2.7*	0.324	0.357	0.389	0.312	0.343	0.375	+0.252	+0.277	+0.302	0.000	0.000	0.000	-0.006	-0.007	-0.008
2.65†	0.331	0.364	0.397	0.319	0.351	0.382	0.258	0.284	0.310	+0.006	+0.007	+0.008	0.000	0.000	0.000

* Density at 0°C, see "Density of Weights," p. 75.

† Density at 20°C, see "Density of Weights," p. 75.

If also $\rho_a'' = \rho_a' = \sigma$, as when the "empty" portion of the container is filled with air of the same density as the surrounding atmosphere, and the vapor of the "object" weighed is negligible or should be included in m ,

$$m = (s'' - s') + (v_m - v_{s''-s'})\sigma \quad (8)$$

or

$$m = (s'' - s')\left(1 - \frac{\sigma}{\Delta}\right) + v_m\sigma = (s'' - s')\left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_m}}\right) \quad (8')$$

In equations (8) and (8') the effect of the container has been eliminated; the equation is of the form of equation (2), and the buoyancy reduction factor from Table 2 may be used.

If the container is exhausted¹ when weighed alone; and if, when the object is being weighed there is in the container only material whose mass should be part of m , then $a' = a'' = 0$ and instead of equations (8) and (8') we have

$$m = (s'' - s') - v_{s''-s'}\sigma = (s'' - s')\left(1 - \frac{\sigma}{\Delta}\right) \quad (9)$$

In this case the buoyant effect of the air on the object weighed has been eliminated, and the ordinary buoyancy reduction factors or equations do not apply (cf. (2) and (3)); Table 2 can not be used.

CORRECTING DENSITY DETERMINATIONS FOR THE BUOYANT EFFECT OF THE AIR

Correcting "Apparent" Values.—Radical differences in the constancy of temperatures or air densities, or such differences as that between equations (8) and (9) above, make it impossible to develop any single correction formula for correcting what are often called "apparent" values of specific gravity, or of density—values which have been determined without proper correction for the buoyant effect of the air. Such values can, however, be corrected in so far as the method and conditions of their determination are known.

Limitations.—In general: (1) It is impossible to correct each weighing on which the determination depends, because some unknown mass, volume, or density will generally be needed in order to find the volume of the air displaced. In some cases, however, approximate values may be known with sufficient accuracy for this purpose.

(2) Some special experimental requirements are always involved. Among these may be equal temperatures for two operations, constant volumes (e.g., of pycnometer), negligible changes in the density of the air, etc., or a combination of several of them. A variety of combinations of such requirements may be used, each

¹ As v , is assumed to remain constant, pressure effects must be suitably eliminated.

having its peculiar advantages, and each leading to a different equation.

(3) If the number of experimental requirements is made very small, the resulting equation for true density is very complex. Simplification of the final solution can be accomplished only by increasing the experimental requirements or by introducing approximations into the solution.

No method can be selected as "best."¹ Hence, the material given here is limited to the general fundamental equations, and to the exact solutions for certain cases that are of wide applicability in work of moderate precision. From these it is possible to arrange procedures suited to many different conditions, and to determine the accuracy of the corresponding solutions, and the effects of different errors under various circumstances.

In every case, ρ_m is obtained in the same units as those in which ρ_a is expressed. For the purposes of the following equations, σ may, in general, be expressed either as g/cm³ or as g/ml.

Density of Gases.—The general equations for weighing gases are the same as those for pycnometer determinations of liquids, particularly those for cases in which the pycnometer is exhausted when weighed alone, as in equation (17).

Experimental Requirements.—All the following equations involve two general requirements: (1) That in any one weighing or other operation all objects involved are at the same temperature (in weighing, the temperature of the atmosphere is involved); and (2) that changes in pressure produce no change in any of the volumes; e.g., the volume of the pycnometer or other container must not change when it is exhausted. In addition, each equation involves one or more of the following special requirements:

A. Mass of pycnometer and its counterpoise remains constant: $p' = p'' = p'''$ and $c' = c'' = c'''$.

B. Coefficient of expansion of counterpoise is the same as that of the pycnometer: $\beta_p = \beta_c$. This makes b the same for all weighings.

C. Temperature at which pycnometer is filled is the same for the material being studied as for the calibrating liquid. Therefore $w'' = \rho_w v_i$ and $l''' = \rho_l v_i$.

D. Temperature for all three weighings is the same as that at which the pycnometer is filled. This results in all volumes being constant, in $v_w'' = v_l''' = v'' = v'''$, in $a' = a'' = 0$, and in the density of each material being constant.

E. Density of the atmosphere the same for all three weighings: $\sigma' = \sigma'' = \sigma'''$.

F. Density of the weights the same in all weighings. This demands that the temperature be the same for all three weighings. See also p. 75.

¹ The advantages and disadvantages of different experimental arrangements, such as the size and mass of the counterpoise used, or the temperature control, do not depend on the form of solution of the equations so much as on the effect of variations and errors that are not shown in the fundamental equations.

G. Density of air or other material in the "empty" portion of the pyknometer equal to that of the surrounding atmosphere: $\rho_a' = \sigma'$, $\rho_a'' = \sigma''$, $\rho_a''' = \sigma'''$.

H. Pyknometer evacuated when weighed empty.

I. Volume of counterpoise equal to "exterior" volume of pyknometer. $v_c = v_w$.

J. Volume of counterpoise equals that of the pyknometer itself, excluding the space that would be filled by liquid at the temperature of filling: $v_c = v_p$.

Pyknometer Determinations.—(1) *Liquids*.—Three weighings are required, from which, under experimental requirement A, w'' and l''' are obtained directly by equation (6). Under requirement C, $\rho_t = \frac{l'''}{w''} \rho_w$.

Therefore under requirements A and C:

$$\rho_t = \frac{(s''' - s') - (a''' - a') + [v_s''' - (v_s''' + v_c''')] \sigma''' - [v_s' - (v_s' + v_c')] \sigma'}{(s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_c'')] \sigma'' - [v_s' - (v_s' + v_c')] \sigma'} \rho_w \quad (10)$$

and

$$v_t = \frac{(s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_c'')] \sigma'' - [v_s' - (v_s' + v_c')] \sigma'}{\rho_w} \quad (11)$$

Under requirement B, b may be introduced for $\frac{v_s - v_c}{v_s}$. If also a part of the buoyancy correction for each weighing is made by calculating s_s' , s_s'' , and s_s''' , then the remaining buoyancy reduction terms can be combined and simplified. Then under requirements A, B, and C the equations may be put in the form

$$\rho_t = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a'' - a'}{v_t} - \frac{b(v_s'' \sigma'' - v_s' \sigma')}{v_t} \right] - \frac{a''' - a'}{v_t} + \frac{b(v_s''' \sigma''' - v_s' \sigma')}{v_t} \quad (12)$$

and

$$v_t = \frac{(s_s'' - s_s') - (a'' - a') + b(v_s'' \sigma'' - v_s' \sigma')}{\rho_w} \quad (13)$$

Under the conditions noted, these equations are perfectly general. They do not involve any mathematical approximations in their derivation and therefore show the proper effect of each quantity. However, in using them, approximate data must, in general, be used, because v_s which is needed in computing v_t cannot be accurately known until after v_t has been computed. If a first approximation is not sufficiently accurate the accuracy may be increased by successive approximations.

{The values of v_s' , v_s'' and v_s''' may be computed from the relation $v_s = v_p + v_t = \frac{p}{\rho_p} + \frac{w}{\rho_w}$, and if the capacity depends solely on temperature (and not on pressure or other factors),

$$v_s' = v_s[1 + \beta_p(l' - t)]; v_s'' = v_s[1 + \beta_p(l'' - t)]; v_s''' = v_s[1 + \beta_p(l''' - t)] \quad (14)$$

The values of a' , a'' , and a''' may be computed from known values of ρ_a and the equations

$$\left. \begin{aligned} v_a' &= v' = v_t[1 + \beta_p(l' - t)] \\ v_a'' &= v'' - v_w'' = v_t(\beta_p - \beta_w)(l'' - t) \\ v_a''' &= v''' - v_t''' = v_t(\beta_p - \beta_t)(l''' - t) \end{aligned} \right\} \quad (15)$$

Under requirements D, E, F, and G, in addition to A, B, and C, (12) becomes

$$\rho_t = \frac{s''' - s'}{s'' - s'} (\rho_w - \sigma) + \sigma \quad (16)$$

And under requirement H in addition to A, B, C, D, E, F, and G

$$\rho_t = \frac{s''' - s'}{s'' - s'} \rho_w \quad (17)$$

As shown in equations (16) and (17), experimental requirements A to G inclusive render the results independent of the size or nature of the counterpoise and of the value of the density of the weights used, though these quantities must be the same for all observations. Including requirement H renders the results independent of the

actual value of the density of the air also, but still requires that this value shall be the same for all three weighings.

Under requirement I, with A, B, and C, (10) becomes

$$\rho_t = \frac{(s_s''' - s_s') - (a''' - a')}{(s_s'' - s_s') - (a'' - a')} \rho_w \quad (18)$$

and its equivalent (12), and (13) become

$$\rho_t = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a'' - a'}{v_t} \right] - \frac{a''' - a'}{v_t} \quad (19)$$

and

$$v_t = \frac{(s_s'' - s_s') - (a'' - a')}{\rho_w} \quad (20)$$

Under requirement J, with A, B, and C, (10) becomes

$$= \frac{(s''' - s') - (a''' - a') + [v''' - v_s'''] \sigma''' - [v' - v_s'] \sigma'}{(s'' - s') - (a'' - a') + [v'' - v_s''] \sigma'' - [v' - v_s'] \sigma'} \rho_w \quad (21)$$

and its equivalent (12), and (13) become

$$\rho_t = \frac{s_s''' - s_s'}{s_s'' - s_s'} \left[\rho_w + \frac{a'' - a'}{v_t} - \frac{1}{v_t} (v''' \sigma''' - v' \sigma') \right] - \frac{a''' - a'}{v_t} + \frac{1}{v_t} (v''' \sigma''' - v' \sigma') \quad (22)$$

and

$$v_t = \frac{(s_s'' - s_s') - (a'' - a') + v''' \sigma''' - v' \sigma'}{\rho_w} \quad (23)$$

Pyknometer Determinations.—(2) *Solids*.—The following equations are based on two pyknometer weighings and a separate determination of the mass of the object. If the pyknometer is used as a container for weighing the object this requires two weighings. (See p. 76 to 78.)

The symbol " refers to the weighing with the calibrating liquid alone; ' to the weighing with both this liquid and the object being studied.

Under requirements A and C only,

$$\rho_w'' = \frac{m \rho_w'}{m - (s''' - s') + (a''' - a') - [v_s''' - v_s'''] \sigma''' + [v_s'' - v_s''] \sigma''} \quad (24)$$

Under requirement B, in addition to A and C, equation (24) may be put into the form (25) by combining the terms in s with those in $v \sigma$.

$$\rho_w'' = \frac{m \rho_w'}{m - (s_s''' - s_s') + (a''' - a') - b(v_s''' \sigma''' - v_s'' \sigma'')} \quad (25)$$

Under requirements D and E, in addition to A, B, and C,

$$\rho_w = \frac{m \rho_w}{m - (s_s''' - s_s'')} \quad (26)$$

This equation is independent of the magnitudes of σ , c , and v_c , merely requiring their constancy.

Hydrostatic Weighings for Density of Solids.—These equations are based on two weighings; one with the object in air and one with it suspended in a liquid (e.g., water) of known density. The equilibrium equations for these weighings are

$$m' - v_m' \sigma' = s' - v_s' \sigma'$$

and

$$m'' - v_m'' \rho_w'' = s'' - v_s'' \rho_w''$$

the notation being similar to that used for pyknometer weighings. If the mass of the object remains constant (i.e., $m' = m''$), (27) is an exact solution of these equations.

$$\rho_w' = \frac{s_s' - s_s''}{s_s' - s_s''} (\rho_w'' [1 + \beta_m(l'' - t')] - \sigma') + \sigma' \quad (27)$$

If also all temperatures, the air density, and the density of the weights are the same in the two weighings,

$$\rho_w = \frac{s' - s''}{s' - s''} (\rho_w - \sigma) + \sigma \quad (28)$$

Correction Formula.—When the result of a density determination is calculated without any correction for the buoyant effect

of the air, a false value (ρ_f) is obtained except for pycnometer determinations in which the conditions of the work are those specified for equation (17).

If for pycnometer determinations, these false values were computed by means of the equation $\rho_f = \frac{s'' - s'}{s'' - s'} \rho_w$ and for hydrostatic

weighings of solids by means of the equation $\rho_f = \frac{s'}{s' - s''} \rho_w$, then to the precision attainable by assuming that the conditions were those specified for equations (16) or (28) the values may be corrected by the equation

$$\rho = \rho_f \left(1 - \frac{\sigma}{\rho_w}\right) + \sigma \quad (29)$$

VOLUME OF A MASS OF LIQUID OF KNOWN WEIGHT IN AIR

(See also p. 73)

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Symbols.— $F = \frac{1 - \frac{\sigma}{\Delta}}{\rho - \sigma}$; t = temperature of the liquid when its volume is V ; t_0 = temperature of the liquid when weighed; V = volume of the liquid at temperature t ; W = weight of the liquid in air against weights of density Δ ; ρ , ρ_0 = density of the liquid at t° and at t_0° , respectively; σ = density of air at time of weighing.

If densities are expressed in g/cm³, and W in g, V is in cm³; if

densities are in g/ml and W in g, V is in ml; if densities are in lb./gal., and W in lb., V is in gal.; etc.

The exact relations connecting these quantities are given by the equation

$$V = \frac{W \left(1 - \frac{\sigma}{\Delta}\right)}{\rho \left(1 - \frac{\sigma}{\rho_0}\right)} = \frac{W}{\rho} \left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_0}}\right) \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}\right) = FW \left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}\right)$$

VALUES OF F FOR WATER AND MERCURY

(Liquids are air-free)

$$V = FW \frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}$$

In many cases the factor $\left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_0}}\right)$ does not differ significantly from unity. If $t_0 = 20^\circ\text{C}$, the greatest value of this factor for the temperature range covered by the following table differs from unity by only 7.3×10^{-6} for water and by 0.48×10^{-6} for mercury.

If $t_0 = t$, $V = FW$. For water, $F = 1 + 0.001 K_{\text{H}_2\text{O}}$; for mercury, $F = 0.07 + 0.001 K_{\text{Hg}}$

Unit of F = milliliter per g of W ; of t = $^\circ\text{C}$. Assumes* $\sigma = 0.0012$ g/ml; $\Delta = 8.3$ g/ml.

t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}	t	$K_{\text{H}_2\text{O}}$	K_{Hg}
0	1.189	3.550	10	1.330	3.683	20	2.832	3.817	30	5.410	3.951	40	8.890	4.085
1	1.130	3.563	11	1.425	3.697	21	3.044	3.830	31	5.720	3.964	41		4.098
2	1.089	3.576	12	1.533	3.710	22	3.267	3.844	32	6.038	3.977	42		4.111
3	1.065	3.590	13	1.654	3.723	23	3.501	3.857	33	6.366	3.991	43		4.125
4	1.057	3.603	14	1.788	3.737	24	3.744	3.870	34	6.702	4.004	44		4.138
5	1.065	3.616	15	1.933	3.750	25	3.998	3.884	35	7.046	4.018	45		4.152
6	1.089	3.630	16	2.090	3.763	26	4.261	3.897	36	7.399	4.031	46		4.165
7	1.127	3.643	17	2.259	3.777	27	4.534	3.910	37	7.760	4.044	47		4.178
8	1.181	3.656	18	2.438	3.790	28	4.817	3.924	38	8.129	4.058	48		4.192
9	1.248	3.670	19	2.630	3.803	29	5.109	3.937	39	8.505	4.071	49		4.205
												50		4.219

* The increase (dK) produced in K by changing Δ to $\Delta(1 + \delta)$ and σ to $\sigma(1 + s)$ is closely given ($\pm 0.1\%$) for the range of this table by the equations:

$$dK_{\text{H}_2\text{O}} = 0.14s(7.3s + 0.997\delta + 8.3s\delta) \frac{1}{1 + \delta}$$

$$dK_{\text{Hg}} = 0.00078(-5.3s + 13.6\delta + 8.3s\delta) \frac{1}{1 + \delta}$$

units being those of this table. For uncertainties in σ , and for the variation of σ with pressure, temperature, and humidity, see p. 78. When brass weights are not used, δ will, in general, be large; in such cases it is desirable to transform the equations once for all by inserting the proper value for δ ; they will take the convenient form $dK = a + bs$. If $\delta = 0$, $dK_{\text{H}_2\text{O}} = 1.0s$; $dK_{\text{Hg}} = 0.0041s$. If $s = 0$, $dK_{\text{H}_2\text{O}} = 0.14s \frac{\delta}{1 + \delta}$; $dK_{\text{Hg}} = 0.010s \frac{\delta}{1 + \delta}$.

Example.—(1) If $\sigma = 0.00132$ and $\Delta = 8.383$, $s = 0.1$, $\delta = 0.01$ and $dK_{\text{H}_2\text{O}} = 0.14s(0.73 + 0.01 + 0.008) \frac{1}{1.01} = 0.144(0.75) = 0.108$. Hence, if $t = 19^\circ\text{C}$, $K_{\text{H}_2\text{O}} = 2.63 + 0.108 = 2.74$.

(2) If $\sigma = 0.00132$ and $\Delta = 2.65$ (quartz), $s = 0.1$, $(1 + \delta) = \frac{2.65}{8.3}$, $\delta = -\frac{5.65}{8.3}$, and $dK_{\text{Hg}} = 0.00078(-0.53 - 9.26 - 0.565)(3.13) = -0.025s$. Hence, if $t = 25^\circ\text{C}$, $K_{\text{Hg}} = 3.884 - 0.025 = 3.859$.

STANDARD BUFFER SOLUTIONS AND ACID-BASE INDICATORS

MANSFIELD CLARK

In the following tables pH represents (formalistically) $\log_{10} \frac{1}{[H^+]}$ where $[H^+]$ is the symbol for grams of hydrogen ions per liter.

Since there is a disagreement concerning the precise interpretation of experimental values, the experimental meaning of pH is defined by the set of conditions described below (8, 57).

The normal hydrogen-electrode is regarded as a properly coated, noble metal, under one atmosphere partial-pressure of hydrogen, immersed in a solution normal with respect to hydrogen ions. The difference of potential between electrode and solution is regarded as zero at all temperatures.

The following values are regarded as *standard* differences of potential (E_s) (liquid-junction potential-difference being eliminated) between the tenth-normal KCl—Hg₂Cl₂—Hg half-cell and the hypothetical, normal hydrogen-electrode.

T°	18	20	25	30	37.5	40	50	60
E_s	0.3380	0.3379	0.3376	0.3372	0.3364	0.3360	0.3341	0.3317

For present purposes it is assumed that the liquid-junction potential-difference between an Hg₂Cl₂ half-cell solution and the solution the pH of which is under measurement has been eliminated when there has been interposed a saturated solution of KCl, or when there has been employed the Bjerrum extrapolation (4) from measurements made with 3.5*N* KCl and 1.75*N* KCl as interposed solutions.

When the electromotive force, e.m.f., of the "chain":



is measured under the above conditions, and the Hg is positive to the Pt, pH is calculated from the equation

$$\frac{\text{E.M.F.} - E_s}{0.00019837(273.09 + t)} = \text{pH}.$$

(See (8, 37, 45, 64) and references therein on potentiometric measurement of pH.)

The chief modes of employing indicators for the determination of pH may be illustrated by the following examples.

I. A solution having been found to induce a blue color with brom thymol blue (see No. 139, Table 3A), a yellow color with thymol blue (No. 129), and a color intermediate between yellow and red with phenol red (No. 142) is judged to have a pH value between 7.0 and 7.8. Then to 10 ± 0.05 cc of solution are added 5 drops 0.04% phenol red solution (made by dissolving 0.1 g phenol red in 28.5 cc 0.01*N* NaOH solution and diluting to 250 cc). The resulting mixture is then compared with standards made by adding 5 drops of the same phenol red solution to each of 10 ± 0.05 cc portions of buffers having pH values of 7.0, 7.2, 7.4, 7.6, etc. (See Table 1A.)

The comparison is made in containers of identical dimensions and under uniform illumination. It is found that the tested solution has a color intermediate and half-way between those of buffers 7.4 and 7.6, and since the total salt contents of the tested solution and of the buffers are of the same order of magnitude, and since the solution contains no protein or substance known to affect the indicator, 7.5 is judged to be the true pH value of the tested solution (8, 11, 31, 37, 45, 53, 54, 56).

II. A solution is found to induce a partial color transformation of phenol red. Using uniform containers (*e.g.*, test tubes) there are prepared:

(1) A mixture of 10 ± 0.05 cc solution under test and 10 drops standard phenol red solution (see I).

(2) A mixture of x drops of indicator and sufficient buffer solution of the value shown in column B of Table 3A to equal the total volume of solution 1.

(3) A mixture of $10 - x$ drops of indicator and sufficient buffer of the value shown in column C of Table 3A to equal the total volume of solution 1.

X is varied and there is found at $x = 4$ a match in color between solution 1 and superposed solutions 2 and 3. From the relation:

$$\text{pH} = \text{pK} + \log \frac{x}{10 - x}, \text{ and the value 7.8 for pK given in Table}$$

3A it is calculated that the value of the tested solution is 7.6 (see in addition to the general references under I (2, 19, 20, 22, 34, 63).

III. A solution is found to induce a partial color-transformation in *m*-nitrophenol (No. 15, Table 3C). It is found that 10 cc of the tested solution plus 1 cc of 0.3% *m*-nitrophenol matches in color 11 cc of an alkalinized solution containing 0.2 cc of 0.3% *m*-nitrophenol. It is thus shown that the tested solution has induced a 20% transformation. If a is the percentage transformation of the indicator, pH is calculated from

$$\text{pH} = \text{pK} + \log \frac{a}{100 - a}$$

In the case at hand $a = 20$, the temperature of the measurement was 25° and the total salt content of the solution was of the order of magnitude of 0.15*M*. Hence from Table 3C, pK is taken as 8.16. By the above equation pH = 7.56.

The equation $\text{pH} = \text{pK} + \log \frac{a}{100 - a}$ cannot be used with picric acid, phenolphthalein or Alizarine yellow GG listed in Table 3C, since these indicators do not behave as monoacidic within the range of pH specified. Empirical data (38) for phenolphthalein and Alizarine yellow GG are shown in Table 4. It is best to vary the amounts of indicator used till the most favorable color-differences are found. (In addition to the material found in the general references under I see (30, 31, 38, 39) for method III.)

pK in the tables represents the pH at which there is an apparent half-transformation of the indicator. For indicators behaving as monoacidic or monobasic, within the zone of pH designated, pK is $\log 1/K_a$ when K_a is the "apparent dissociation constant" (43). When an indicator, such as phenolphthalein, is known not to behave as monoacidic within the range of pH designated, pK is bracketed.

pK values listed in Tables 3A and 3C are uniform with respect to the bases of reference. Those of the indicators in the general list (Table 2) are referred to such a variety of bases that tabulation is impracticable. The reader is therefore referred to original articles (8, 31, 37, 43, 45, 51, 58, 59, 60, 61, 67.)

The values assigned to useful pH ranges are somewhat arbitrary, depending upon concentration of indicator, the spectral distribution of illumination, and psychological preferences.

Indicator solutions are affected to various degrees by

- Total salt content.
- Specific ions: *e.g.*, alizarine red S is affected by borates differently than by phosphates (67).
- Colloidal suspensions, protein solutions, etc.: *e.g.*, congo red in a gelatine solution of pH 3.6 behaved as if the pH were 5.6 (53). Neutral red in soap solutions forms a fatty acid complex (27).
- Presence of immiscible solvents: *e.g.*, chloroform used for disinfection removes benzene-azo-benzyl-aniline from the aqueous phase (53).

- e. Mixed solvents and change of solvent (3, 31, 32, 40, 62).
 f. Temperature. See Table 3A, 3C.
 g. Time: e.g., water blue changes color slowly and propyl red precipitates.
 h. Destructive agents: e.g., methyl red is irreversibly reduced in some bacterial cultures.

Since it is impracticable to tabulate all available data, only representative "salt" and temperature effects are given in Tables 3A, 3B and 4.

The indicators of Table 3 include the better of those which may be used in acidimetric and alkalimetric titration. (For principles see (5, 31, 43, 45).)

TABLE 1.—STANDARD BUFFER SOLUTIONS

The following tables give the compositions of solutions which furnish, at the temperatures indicated, values of pH which conform in essential respects to the specifications listed in the general notes above. Recalculation to make the conformity rigid would involve changes in the original data which would be less than the uncertainties of the working standards used in the experiments. The solutions listed may serve as standards for the colorimetric measurements of pH. The solutions suffer relatively slight displacement of pH with addition or subtraction of small proportions of acid or alkali. This property is referred to as that of a *buffer* (*puffer, tampon*). (For buffer solutions see (8, 37, 45, 64).)

A. STANDARD BUFFER SOLUTIONS OF CLARK AND LUBS (10) AT 20°
 50 cc A + x cc B diluted to 200 cc

A = 0.2M KCl* B = 0.2M HCl		A = 0.2M KH o-phthal- ate B = 0.2M HCl		A = 0.2M KH o-phthal- ate B = 0.2M NaOH		A = 0.2M KH ₂ PO ₄ B = 0.2M NaOH		A = 0.2M H ₂ BO ₃ † + 0.2M KCl B = 0.2M NaOH	
pH	cc B	pH	cc B	pH	cc B	pH	cc B	pH	cc B
1.2	64.5	2.2	46.70	4.0	0.40	5.8	3.72	7.8	2.61
1.4	41.5	2.4	39.60	4.2	3.70	6.0	5.70	8.0	3.97
1.6	26.3	2.6	32.95	4.4	7.50	6.2	8.60	8.2	5.90
1.8	16.6	2.8	26.42	4.6	12.15	6.4	12.60	8.4	8.50
2.0	10.6	3.0	20.32	4.8	17.70	6.6	17.80	8.6	12.00
2.2	6.7	3.2	14.70	5.0	23.85	6.8	23.65	8.8	16.30
		3.4	9.90	5.2	29.95	7.0	29.63	9.0	21.30
		3.6	5.97	5.4	35.45	7.2	35.00	9.2	26.70
		3.8	2.63	5.6	39.85	7.4	39.50	9.4	32.00
				5.8	43.00	7.6	42.80	9.6	36.85
				6.0	45.45	7.8	45.20	9.8	40.80
				6.2	47.00	8.0	46.80	10.0	43.90

B. SØRENSEN'S GLYCOCOLL-NACl-HCl MIXTURES (56)

Glycocoll solution: 0.1M Glycocoll + 0.1M NaCl per l; HCl: 0.1N. Values hold between 10°–70° (66)

Glycocoll (cc)	0.0	1.0	2.0	3.0	4.0	5.0
HCl (cc)	10.0	9.0	8.0	7.0	6.0	5.0
pH	1.04	1.15	1.25	1.42	1.65	1.93

Glycocoll (cc)	6.0	7.0	8.0	9.0	9.5
HCl (cc)	4.0	3.0	2.0	1.0	0.5
pH	2.28	2.61	2.92	3.34	3.68

C. SØRENSEN'S CITRATE-HCl MIXTURES (56)

Citrate solution: 21.008 g crystn. citric acid + 200 cc N NaOH per l; HCl: 0.1N. Values hold between 10°–70° (66)

Citrate (cc)	0.0	1.0	2.0	3.0	3.33	4.0	4.5	4.75
HCl (cc)	10.0	9.0	8.0	7.0	6.67	6.0	5.5	5.25
pH	1.04	1.17	1.42	1.93	2.27	2.97	3.36	3.53

* The pH values of these mixtures are given by Clark and Lubs as preliminary measurements.

† The old atomic weight (11.0) of boron is used throughout these tables.

Citrate (cc)	5.0	5.5	6.0	7.0	8.0	9.0	9.5	10.0
HCl (cc)	5.0	4.5	4.0	3.0	2.0	1.0	0.5	0.0
pH	3.69	3.95	4.16	4.45	4.65	4.83	4.89	4.96

D. SØRENSEN'S PHOSPHATE MIXTURES (55, 56)

9.078 g KH₂PO₄, 11.876 g Na₂HPO₄·2H₂O each per l. Values hold between 10°–70° (66).

Na ₂ HPO ₄ (cc)	0.25	0.5	1.0	2.0	3.0	4.0
KH ₂ PO ₄ (cc)	9.75	9.5	9.0	8.0	7.0	6.0
pH	5.29	5.59	5.91	6.24	6.47	6.64

Na ₂ HPO ₄ (cc)	5.0	6.0	7.0	8.0	9.0	9.5
KH ₂ PO ₄ (cc)	5.0	4.0	3.0	2.0	1.0	0.5
pH	6.81	6.98	7.17	7.38	7.73	8.04

E. SØRENSEN'S CITRATE-NAOH MIXTURES (56); WALBUM'S VALUES (66)

Citrate solution; 21.008 g crystn. citric acid + 200 cc N NaOH per l; NaOH: 0.1N

Volume parts		Temperature							
Citrate	NaOH	10°	20°	30°	40°	50°	60°	70°	
10.0	0.0	4.93	4.96	5.00	5.04	5.07	5.10	5.14	
9.5	0.5	4.99	5.02	5.06	5.10	5.13	5.16	5.20	
9.0	1.0	5.08	5.11	5.15	5.19	5.22	5.25	5.29	
8.0	2.0	5.27	5.31	5.35	5.39	5.42	5.45	5.49	
7.0	3.0	5.53	5.57	5.60	5.64	5.67	5.71	5.75	
6.0	4.0	5.94	5.98	6.01	6.04	6.08	6.12	6.15	
5.5	4.5	6.30	6.34	6.37	6.41	6.44	6.47	6.51	
5.25	4.75	6.65	6.69	6.72	6.76	6.79	6.83	6.86	

F. SØRENSEN'S BORATE-HCl MIXTURES (56); WALBUM'S VALUES (66)

Borate: 12.404 g H₂BO₃ + 100 cc N NaOH per l; HCl: 0.1N

Volume parts		Temperature							
Borate	HCl	10°	20°	30°	40°	50°	60°	70°	
10.0	0.0	9.30	9.23	9.15	9.08	9.00	8.93	8.86	
9.5	0.5	9.22	9.15	9.08	9.01	8.94	8.87	8.80	
9.0	1.0	9.14	9.07	9.01	8.94	8.87	8.80	8.74	
8.5	1.5	9.06	8.99	8.92	8.86	8.80	8.73	8.67	
8.0	2.0	8.96	8.89	8.83	8.77	8.71	8.65	8.59	
7.5	2.5	8.84	8.79	8.72	8.67	8.61	8.55	8.50	
7.0	3.0	8.72	8.67	8.61	8.56	8.50	8.45	8.40	
6.5	3.5	8.54	8.49	8.44	8.40	8.35	8.30	8.26	
6.0	4.0	8.32	8.27	8.23	8.18	8.15	8.11	8.08	
5.75	4.25	8.17	8.13	8.09	8.06	8.02	7.98	7.95	
5.5	4.5	7.96	7.93	7.89	7.86	7.82	7.79	7.76	
5.25	4.75	7.64	7.61	7.58	7.55	7.52	7.49	7.47	

H. SØRENSEN'S BORATE-NAOH MIXTURES (56); WALBUM'S VALUES (66)

Borate: 12.404 g H₂BO₃ + 100 cc N NaOH per l; NaOH: 0.1N

Volume parts		Temperature								
Borate	NaOH	10°	14°	18°	22°	26°	30°	34°	37°	
10	0.0	9.30	9.27	9.24	9.21	9.18	9.15	9.13	9.11	
9	1	9.42	9.39	9.36	9.33	9.29	9.26	9.23	9.20	
8	2	9.57	9.54	9.50	9.46	9.43	9.39	9.35	9.32	
7	3	9.76	9.72	9.68	9.63	9.59	9.55	9.50	9.47	
6	4	10.06	10.02	9.97	9.91	9.86	9.80	9.75	9.71	
5	5	11.24	11.16	11.08	10.99	10.91	10.82	10.74	10.68	
4	6	12.64	12.51	12.38	12.25	12.13	12.00	11.87	11.77	

Continued on p. 84.

G. SØRENSEN'S GLYCOCOLL- NaCl - NaOH MIXTURES ⁽⁵⁶⁾; WALBUM'S VALUES ⁽⁶⁶⁾

 Glycocoll: 7.505 g glycocoll + 5.85 g NaCl per l; NaOH : 0.1N

Volume parts		Temperature														
Glycocoll	NaOH	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	37°	40°
9.5	0.5	8.75	8.70	8.66	8.62	8.58	8.53	8.49	8.45	8.40	8.37	8.32	8.28	8.24	8.18	8.12
9.0	1.0	9.10	9.06	9.02	8.97	8.93	8.88	8.84	8.79	8.75	8.71	8.67	8.62	8.58	8.52	8.45
8.0	2.0	9.54	9.50	9.45	9.40	9.36	9.31	9.26	9.22	9.17	9.13	9.08	9.04	9.00	8.92	8.85
7.0	3.0	9.90	9.85	9.80	9.75	9.71	9.66	9.61	9.56	9.51	9.46	9.42	9.37	9.32	9.25	9.18
6.0	4.0	10.34	10.29	10.24	10.18	10.14	10.09	10.03	9.98	9.93	9.88	9.83	9.78	9.73	9.66	9.58
5.5	4.5	10.68	10.63	10.58	10.53	10.48	10.42	10.37	10.32	10.27	10.22	10.17	10.12	10.07	9.99	9.91
5.1	4.9	11.29	11.24	11.18	11.12	11.07	11.01	10.96	10.90	10.85	10.79	10.74	10.68	10.62	10.54	10.46
5.0	5.0	11.53	11.48	11.42	11.36	11.31	11.25	11.20	11.14	11.09	11.03	10.97	10.92	10.86	10.78	10.70
4.9	5.1	11.80	11.74	11.68	11.62	11.57	11.51	11.45	11.39	11.33	11.27	11.22	11.16	11.10	11.02	10.93
4.5	5.5	12.34	12.28	12.22	12.16	12.10	12.04	11.98	11.92	11.86	11.80	11.74	11.68	11.62	11.53	11.44
4.0	6.0	12.65	12.59	12.52	12.46	12.40	12.33	12.27	12.21	12.15	12.09	12.03	11.96	11.90	11.81	11.72
3.0	7.0	12.92	12.86	12.80	12.73	12.67	12.60	12.54	12.48	12.42	12.35	12.29	12.23	12.17	12.07	11.98
2.0	8.0	13.12	13.06	12.99	12.92	12.86	12.79	12.73	12.66	12.60	12.53	12.47	12.41	12.34	12.25	12.15
1.0	9.0	13.23	13.16	13.09	13.03	12.97	12.90	12.83	12.77	12.70	12.64	12.57	12.51	12.45	12.35	12.25

Volume parts		Temperature														
Glycocoll	NaOH	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°	62°	64°	66°	68°	70°
9.5	0.5	8.07	8.03	7.99	7.95	7.91	7.86	7.82	7.78	7.74	7.69	7.65	7.61	7.56	7.52	7.48
9.0	1.0	8.41	8.37	8.32	8.28	8.24	8.19	8.14	8.10	8.06	8.02	7.97	7.93	7.88	7.84	7.79
8.0	2.0	8.81	8.76	8.72	8.67	8.63	8.58	8.53	8.49	8.44	8.40	8.35	8.30	8.26	8.21	8.16
7.0	3.0	9.13	9.08	9.03	8.99	8.94	8.89	8.84	8.79	8.74	8.70	8.65	8.60	8.55	8.50	8.45
6.0	4.0	9.53	9.48	9.43	9.38	9.33	9.28	9.23	9.18	9.13	9.08	9.03	8.98	8.93	8.88	8.82
5.5	4.5	9.86	9.81	9.76	9.71	9.66	9.61	9.56	9.51	9.46	9.41	9.35	9.30	9.25	9.20	9.15
5.1	4.9	10.40	10.35	10.29	10.24	10.18	10.13	10.07	10.02	9.96	9.90	9.85	9.79	9.74	9.68	9.62
5.0	5.0	10.64	10.59	10.54	10.48	10.43	10.37	10.32	10.26	10.20	10.14	10.09	10.04	9.98	9.93	9.87
4.9	5.1	10.87	10.81	10.75	10.69	10.64	10.58	10.52	10.46	10.40	10.35	10.29	10.23	10.17	10.11	10.05
4.5	5.5	11.38	11.32	11.26	11.20	11.14	11.08	11.02	10.96	10.90	10.84	10.78	10.72	10.66	10.60	10.54
4.0	6.0	11.65	11.59	11.53	11.47	11.41	11.34	11.28	11.22	11.16	11.10	11.03	10.97	10.91	10.84	10.78
3.0	7.0	11.91	11.85	11.79	11.73	11.66	11.60	11.54	11.47	11.41	11.35	11.28	11.22	11.16	11.09	11.03
2.0	8.0	12.08	12.02	11.96	11.89	11.83	11.77	11.70	11.64	11.57	11.51	11.44	11.38	11.31	11.25	11.18
1.0	9.0	12.19	12.13	12.06	12.00	11.94	11.87	11.80	11.74	11.67	11.61	11.54	11.48	11.41	11.35	11.28

 J. PH VALUES OF BORAX-BORATE MIXTURES AT 18°C AND "SALT-EFFECTS" FOR PHENOLPHTHALEIN AND α -NAPHTHOLPHTHALEIN
 PALITZSCH ⁽⁴⁴⁾

 Borax solution: 19.108 g $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ in 1 l. Boric acid solution: 12.404 g H_3BO_3 + 2.925 g NaCl in 1 l

Standard solutions			True pH values of sea water containing S parts per 1000 salinity at color-match with standard											
Borax cc	Boric acid cc	pH	S = 36	S = 30	S = 26	S = 22	S = 18	S = 14	S = 10	S = 6	S = 4	S = 2	S = 1	
6.0	4.0	8.69	8.48	8.49	8.50	8.52	8.54	8.57	8.59	8.63	8.66	8.69	8.72	Phenolphthalein
5.5	4.5	8.60	8.39	8.40	8.41	8.43	8.45	8.48	8.50	8.54	8.57	8.60	8.63	
5.0	5.0	8.51	8.30	8.31	8.32	8.34	8.36	8.39	8.41	8.45	8.48	8.51	8.54	
4.5	5.5	8.41	8.20	8.21	8.22	8.24	8.26	8.29	8.31	8.35	8.38	8.41	8.44	
4.0	6.0	8.31	8.10	8.11	8.12	8.14	8.16	8.19	8.21	8.25	8.28	8.31	8.34	
3.5	6.5	8.20	7.99	8.00	8.01	8.03	8.05	8.08	8.10	8.14	8.17	8.20	8.23	α -Naphtholphthalein
4.5	5.5	8.41	8.19	8.20	8.21	8.23	8.25	8.28	8.32	8.37	8.40	8.45	8.48	
4.0	6.0	8.31	8.09	8.10	8.11	8.13	8.15	8.18	8.22	8.27	8.30	8.35	8.38	
3.5	6.5	8.20	7.98	7.99	8.00	8.02	8.04	8.07	8.11	8.16	8.19	8.24	8.27	
3.0	7.0	8.08	7.86	7.87	7.88	7.90	7.92	7.95	7.99	8.04	8.07	8.12	8.15	
2.5	7.5	7.94	7.72	7.73	7.74	7.76	7.78	7.81	7.85	7.90	7.93	7.98	8.01	
2.3	7.7	7.88	7.66	7.67	7.68	7.70	7.72	7.75	7.79	7.84	7.87	7.92	7.95	
2.0	8.0	7.78	7.56	7.57	7.58	7.60	7.62	7.65	7.69	7.74	7.77	7.82	7.85	
1.5	8.5	7.60	7.38	7.39	7.40	7.42	7.44	7.47	7.51	7.56	7.59	7.64	7.67	
1.0	9.0	7.36	7.14	7.15	7.16	7.18	7.20	7.23	7.27	7.32	7.35	7.40	7.43	
0.6	9.4	7.09	6.87	6.88	6.89	6.91	6.93	6.96	7.00	7.05	7.08	7.13	7.16	
0.3	9.7	6.77	6.55	6.56	6.57	6.59	6.61	6.64	6.68	6.73	6.76	6.81	6.84	

H. SPØRSEN'S BORATE-NAOH MIXTURES.—(Continued)

Borate	NaOH	Temperature							
		40°	44°	48°	52°	56°	60°	64°	70°
10	0.0	9.08	9.05	9.02	9.00	8.97	8.93	8.90	8.86
9	1	9.18	9.15	9.11	9.08	9.05	9.01	8.98	8.94
8	2	9.30	9.26	9.22	9.18	9.15	9.11	9.08	9.02
7	3	9.44	9.40	9.35	9.31	9.27	9.22	9.18	9.12
6	4	9.67	9.62	9.56	9.51	9.46	9.40	9.35	9.28
5	5	10.61	10.53	10.44	10.36	10.27	10.19	10.10	9.98
4	6	11.68	11.55	11.42	11.29	11.17	11.04	10.91	10.72

I. ACETIC ACID-ACETATE MIXTURES; WALPOLE'S VALUES
(RECALCULATED) (68)

CH ₃ CO ₂ H <i>M</i>	0.185	0.176	0.164	0.147	0.126	0.102
CH ₃ CO ₂ Na <i>M</i>	0.015	0.024	0.036	0.053	0.074	0.098
pH.....	3.6	3.8	4.0	4.2	4.4	4.6
CH ₃ CO ₂ H <i>M</i>	0.080	0.059	0.042	0.029	0.019	
CH ₃ CO ₂ Na <i>M</i>	0.120	0.141	0.158	0.171	0.181	
pH.....	4.8	5.0	5.2	5.4	5.6	

TABLE 2.—GENERAL LIST OF INDICATORS

The following list of indicators includes all those for which data on the pH-ranges have been found. Many of the data of this table are to be regarded with caution, because in some cases the names proposed are inadequate for complete identification, and in others names have been given to materials of uncertain composition (8, 11, 31, 37, 45, 53, 54, 56, 64).

The Schultz (S.....) and Rowe (R.....) numbers are taken from the 1923 (52) and 1924 (46) editions, respectively, of these works. Delicate shades of meaning in the color nomenclature have often been lacking. The abbreviations used are as follows: b, blue; br, brown; c, colorless; f, fades; fl, fluorescent; g, green; o, orange; p, pink; pu, purple; r, red; v, violet; y, yellow. pK is the pH at which there is an apparent half-transformation of the indicator. * indicates that the indicator has been studied in sufficient detail to be used in supplementing the lists of Table 3.

NITRO COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
1	2, 4, 6-Trinitrophenol; Picric acid [S. 5; R. 7].....	c 0.0- 1.3 y	(31, 39)
2	2, 6-Dinitrophenol [Michaelis' β].....	c 2.0- 4.0 y	(31, 38, 39)
3	2, 4-Dinitro-α-naphthol; Manchester yellow [S. 6; R. 9].....	y 2.0- 4.0 y	(9)
4	2, 4-Dinitrophenol [Michaelis' α].....	c 2.6- 4.4 y	(31, 38, 39)
5	Dinitrohydroquinol.....	3-10	(23, 46)
6	Nitrohydroquinol.....	3-11	(46)
7	2, 3-Dinitrophenol [Michaelis' ε].....	c 3.9- 5.9 y	(31, 38, 39)
8	2, 5-Dinitrophenol [Michaelis' γ].....	c 4.0- 5.8 y	(31, 38, 39)
9	2, 6-Dinitro-4-aminophenol; Isopicramic acid.....	p 4.1- 5.6 y	(87)
10	3, 4-Dinitrophenol [Michaelis' δ].....	c 4.3- 6.3 y	(38, 39)
11	4-Nitro-6-aminoguaiacol.....	y 4.5- 8.0 r	(35)
12	<i>p</i> -Nitrophenol.....	c 5.6- 7.6 y	(31, 38, 39, 56)
13	<i>o</i> -Nitrophenol.....	c 5.0- 7.0 y	(46)
14	* Dinitrobenzoylene urea.....	c 6.0- 8.0 y	(6)
15	<i>m</i> -Nitrophenol.....	c 6.8- 8.6 y	(31, 38, 39)
16	2, 4, 6-Trinitrophenyl-methyl-nitroamine; Nitramine.....	c 10.8-13.0 br	(31, 33)
17	<i>sym.</i> -Trinitrobenzene.....	c 12.0-14.0 o; f	(50)
18	2, 4, 6-Trinitrotoluene.....	p 11.5-14.0 o	(9)

MONO-AZO COMPOUNDS

19	<i>p</i> -Toluene-azo-phenyl-aniline.....	1.0- 2.0	(53, 54, 56)
20	<i>p</i> -Carboxybenzene-azo-dimethylaniline; Para methyl red.....	r 1.0- 3.0 y	(9, 60)
21	<i>p</i> -Toluene-azo-phenyl-α-naphthylamine.....	1.1- 1.9	(53, 54, 56)
22	Benzene-azo-diphenylamine.....	p 1.2- 2.1 y	(56)
23	<i>m</i> -Benzenesulfonic acid-azo-diphenylamine; Metanil yellow [S. 134; R. 138].....	r 1.2- 2.3 y	(56)
24	Benzene-azo-phenyl-α-naphthylamine.....	v 1.4- 2.6 o	(53, 54, 56)
25	<i>p</i> -Benzenesulfonic acid-azo-diphenylamine; Tropaeolin OO [S. 139; R. 143].....	r 1.4- 2.6 y	(56, 60)
26	<i>o</i> -Toluene-azo- <i>o</i> -toluidine; Spirit yellow R [S. 68; R. 17].....	1.4- 2.9	(53, 54, 56)
27	<i>p</i> -Toluene-azo-benzyl-α-naphthylamine.....	1.6- 2.6	(53, 54, 56)
28	<i>p</i> -Toluene-azo-benzyl-aniline.....	1.6- 2.8	(53, 54, 56)
29	Benzene-azo-benzyl-α-naphthylamine.....	1.9- 2.9	(53, 54, 56)
30	Benzene-azo-aniline; Amino-azo-benzene [S. 31; R. 15].....	y 1.9- 3.3 y	(53, 54, 56, 60)
31	<i>p</i> -Benzenesulfonic acid-azo-aniline.....	r 1.9- 3.3 y	(52, 53, 54, 60)
32	<i>p</i> -Benzenesulfonic acid-azo-benzylaniline.....	r 1.9- 3.3 y	(56, 60)
33	<i>m</i> -Carboxybenzene-azo-dimethylaniline.....	r 2.0- 4.0 y	(11)
34	Benzene-azo-benzylaniline.....	p 2.3- 3.3 y	(56)
35	<i>p</i> -Benzenesulfonic acid-azo- <i>m</i> -chlorodiethylaniline.....	r 2.6- 4.0 y	(56, 60)
36	<i>m</i> -Nitrobenzene-azo-β-naphthol-3, 6-disulfonic acid; Orange III [S. 47; R. 39].....	r 2.6- 4.6 y	(9)
37	Benzene-azo-dimethylaniline; Töpfer's indicator [S. 32; R. 19].....	r 2.9- 4.0 y	(56, 60)
38	<i>o</i> -Carboxybenzene-azo-α-naphthylamine.....	r 2.9- 5.8 y	(61)
39	<i>p</i> -Benzenesulfonic acid-azo- <i>o</i> -toluidine.....	mid-point 2.9	(60)

MONO-AZO COMPOUNDS.—(Continued)

Index No.	Indicator	Color and useful range pH	Lit.
40	<i>p</i> -Benzenesulfonic acid-azo- <i>m</i> -xylydine.....	mid-point 2.9	(60)
41	<i>o</i> -Carboxybenzene-azo-diphenylamine.....	p 3.0–4.6 y	(11)
42	<i>p</i> -Benzenesulfonic acid-azo-methylaniline.....	r 3.1–4.2 y	(53, 54, 56, 60)
43	<i>p</i> -Benzenesulfonic acid-azo-ethyl aniline.....	r 3.1–4.4 y	(53, 54, 56, 60)
44	<i>p</i> -Benzenesulfonic acid-azo-dimethylaniline; Methyl orange [S. 138; R. 142].....	r 3.1–4.4 y	(56, 60)
45	<i>p</i> -Benzenesulfonic acid-azo-diethylaniline; Ethyl orange.....	r 3.5–4.5 y	(53, 54, 56, 60)
46	<i>o</i> -Benzenesulfonic acid-azo-dimethylaniline.....	mid-point 3.5	(60)
47	<i>p</i> -Benzenesulfonic acid-azo- <i>m</i> -toluidine.....	mid-point 3.5	(60)
48	<i>p</i> -Benzenesulfonic acid-azo- <i>p</i> -xylydine.....	mid-point 3.6	(60)
49	* <i>p</i> -Sulfo- <i>o</i> -methoxybenzene-azo-dimethyl- α -naphthylamine.....	b 3.5–4.9 o	(42)
50	<i>p</i> -Benzenesulfonic acid-azo- α -naphthylamine.....	r 3.5–5.7 y	(56, 61)
51	<i>p</i> -Benzenesulfonic acid-azo-phenyl- α -naphthylamine.....	v 3.5–6.5 o	(61)
52	<i>o</i> -Carboxybenzene-azo-phenyl- α -naphthylamine.....	v 3.5–6.5 o	(61)
53	Benzene-azo- α -naphthylamine.....	r 3.7–5.0 y	(56, 61)
54	<i>p</i> -Toluene-azo- α -naphthylamine.....	3.7–5.0	(53, 54, 56)
55	<i>o</i> -Carboxybenzene-azo-methylaniline.....	r 4.0–6.0 y	(11)
56	Benzene-azo- <i>m</i> -phenylenediamine; Chrysoidine [S. 33; R. 20].....	o 4.0–7.0 y	(9)
57	<i>o</i> -Carboxybenzene-azo-ethylaniline.....	r 4.2–6.2 y	(11)
58	<i>o</i> -Carboxybenzene-azo- <i>n</i> -propylaniline.....	r 4.2–6.2 y	(11)
59	<i>o</i> -Carboxybenzene-azo-dimethylaniline; Methyl red [R. 211].....	r 4.2–6.3 y	(11, 14, 56, 60)
60	<i>o</i> -Carboxybenzene-azo-diethylaniline; Ethyl red.....	r 4.4–6.2 y	(11, 60)
61	* <i>o</i> -Carboxybenzene-azo-di- <i>n</i> -propylaniline; Propyl red.....	r 4.6–6.6 y	(11)
62	<i>o</i> -Carboxybenzene-azo- <i>m</i> -phenylenediamine.....	o 4.6–7.6 y	(9)
63	Benzene-azo-dimethyl- α -naphthylamine.....	4.8–5.5	(53, 54, 56)
64	<i>p</i> -Benzenesulfonic acid-azo-dimethyl- α -naphthylamine.....	r 5.0–5.7 o	(53, 54, 56, 61)
65	<i>o</i> -Carboxybenzene-azo- α -naphthylamine.....	p 5.6–7.0 y	(11)
66	<i>o</i> -Carboxybenzene-azo-(di or mono?)-amyl aniline.....	o 5.6–7.6 y	(11)
67	<i>o</i> -Carboxybenzene-azo-dimethyl- α -naphthylamine.....	r 5.6–7.6 o	(11, 61)
68	4-Sulfo- α -naphthalene-azo- α -naphthol; Naphthylamine brown [S. 160; R. 175].....	o 6.0–8.4 p	(9)
69	Tropaeolin?.....	y 7.0–9.0 r	(50)
70	6-Sulfo- α -naphthol-1-azo- <i>m</i> -hydroxybenzoic acid.....	{ o 7.0–8.0 b v 12–13 r	{ (67)
71	Curcumine?.....	y 7.4–8.6 b	(31)
72	<i>p</i> -Benzenesulfonic acid-azo- α -naphthol; Tropaeolin OOO No. 1 [S. 144; R. 150].....	y 7.6–8.9 p	(56)
73	<i>p</i> -Benzenesulfonic acid-azo- β -naphthol; Tropaeolin OOO No. 2 [S. 145; R. 151].....	7.6–8.9(?)	(45)
74	<i>m</i> -Nitrobenzene-azo-salicylic acid; Alizarine yellow GG [S. 48; R. 36].....	c(?) 10.0–12.0 y	(38, 39)
75	<i>p</i> -Nitrobenzene-azo-salicylic acid; Alizarine yellow R [S. 58; R. 40].....	y 10.0–12.1 y	(56)
76	α -Naphthylaminosulfonic acid-azo- β -naphthol; Red I [S. 161; R. 176].....	10.5–12.1	(53, 54, 56)
77	α -Naphthalene-azo- β -naphthol-3, 6-disulfonic acid; Bordeaux B [S. 112; R. 88].....	p 10.5–12.5 o	(9)
78	<i>p</i> -Benzenesulfonic acid-azo-resorcinol; Tropaeolin O [S. 143; R. 148].....	y 11.1–12.7 o	(56)
79	Benzene-azo- β -naphthol-6, 8-disulfonic acid; Orange GG [S. 38; R. 27].....	y 11.5–14.0 p	(9)
80	Crocein?.....	p 12.0–14.0 v	(50)
81	Helianthin (Grübler)?.....	o 11.0–12.0 r	(9)
82	Helianthin I?.....	o 11.0–13.0 r	(50)
83	Helianthin II?.....	y 13.0–14.0 v	(50)
84	Curcumein?.....	{ o 0.0–1.0 y y 13.0–15.0 g	{ (50)

DIS-AZO COMPOUNDS

85	Ditolyl-disazo-bis- β -naphthylamine-6-sulfonic acid; Benzopurpurin B [S. 365; R. 450].....	{ b 0.3–1.0 v v 1.0–5.0 y y 12.0–14.0 r	{ (50)
86	Ditolyl-disazo-bis- α -naphthylamine-4-sulfonic acid; Benzopurpurin 4B [S. 363; R. 448].....	v 1.3–4.0 r	(31)
87	Diphenyl-disazo-bis- α -naphthylamine-4-sulfonic acid; Congo red [S. 307; R. 370].....	b 3.0–5.0 r	(50)
88	Ditolyl-disazo-bis- α -naphthol-4-sulfonic acid; Azo blue [S. 377; R. 463].....	v 10.5–11.5 p	(9)
89	Curcumin W [Probably Rowe, 364 (21)].....	{ mid-point 7.3 mid-point 7.6	{ (49) (18)

TRIPHENYLMETHANE DERIVATIVES

Index No.	Indicator	Color and useful range pH	Lit.
90	Methylated pararosaniline; Crystal violet [S. 516; R. 681].....	g 0.0- 2.0 b	(9)
91	<i>p</i> , <i>p'</i> -Tetramethyldiamino-triphenylcarbinol; Malachite green [S. 495; R. 657]	{ y 0.0- 2.0 g b 11.5-14.0 f	{ (50)
92	Hofmann's violet; Methylated rosanilines and pararosanilines [S. 514; R. 679]	g 0.0- 2.0 b	(9)
93	Tetraethyl-diamino-triphenyl-carbinol; Brilliant green [S. 499; R. 662].....	y 0.0- 2.6 g	(9)
94	Heptamethylrosaniline; Iodine green [R. 686]	y 0.0- 2.6 b	(9)
95	Hexaethylpararosaniline; Ethyl violet [S. 518; R. 682].....	y 0.0- 3.6 b	(9)
96	Ethyl-hexamethyl-pararosaniline; Ethyl green [R. 685].....	y 0.3- 2.0 b	(31)
97	Methyl violet 6B; Benzylated tetra- and pentamethyl-pararosaniline [S. 517; R. 683]	y 0.15- 3.2 v	(56)
98	Gentian violet; mixture.....	0.4- 2.7	(53, 54, 56)
99	Aniline red; Rosaniline and pararosaniline [S. 512; R. 677].....	pu 1.2- 3.0 f	(9)
100	Red violet 5RS; Di- and tri-sulfonate of ethylosaniline [S. 525; R. 693].....	p 3.6- 6.0 c	(9)
101	Resazurin [R. 727 note].....	o 3.8- 6.5 v	(31)
102	China blue [S. 539; R. 707]; Mixture.....	b 4.7- 7.0 c	(9)
103	Rosolic acid [S. 555; R. 724]; Mixture.....	br 6.9- 8.0 r	(56)
104	Alkali blue 4B [S. 536; R. 704]; Mixture.....	v 9.4-14.0 p	(9)
105	XL Soluble blue [S. 538; R. 706]; Mixture.....	b 10.0-13.0 p	(9)
106	Poirrier's blue.....	b 11.0-13.0 r	(8)
107	Acid fuchsin; Di- and tri-sulfonic acids of rosaniline and pararosaniline [S. 524; R. 692].....	r 12.0-14.0 f	(50)

PHTHALEINS AND RELATED COMPOUNDS

108	Diethyl- <i>m</i> -amino-phenolphthalein; Rhodamine B [S. 573; R. 749].....	o 0.1- 1.2 p	(9)
109	Pyrogallol-phthalein; Gallein [S. 599; R. 781].....	variable 0-14	(50)
110	Tetrabromofluorescein; Eosine Y S [S. 587; R. 768].....	y 0 - 3.0 fl	(9)
111	Erythrosin (iodeosin); Di- or tetra iodated fluorescein [S. 591, 592?; R. 772, 773?].....	o 0.0- 3.6 fl	(9)
112	Phloxin red B.H. (Grübler)?.....	p 1.4- 3.6 r	(9)
113	Dihydroxyfluoran; Uranin (fluorescein) [S. 585; R. 766].....	y 3.6- 5.6 fl	(9)
114	Dichlorofluorescein.....	y 4.0- 6.6 fl	(9)
115	<i>o</i> - α -Naphthol phthalein.....	y 8.9- 9.5g(f)	(17)
116	<i>p</i> - α -Naphthol phthalein.....	y 7.0- 9.0 b	(56)
117	Tetrabromophenol phthalein.....	c 8.0- 9.0 v	(48)
118	<i>o</i> -Cresoltetrachlorophthalein.....	c 8.5- 9.0 pu	(1)
119	<i>o</i> -Cresolphthalein.....	c 8.2- 9.8 r	(11, 14)
120	Phenolphthalein [R. 764].....	c 8.3-10.0 r	(38, 39, 56)
121	*1, 2, 3-Xylenolphthalein.....	c 8.9-10.2 b	(17)
122	Thymolphthalein.....	c 9.3-10.5b(f)	(56)
123	Dibromo-dinitrofluorescein; Eosin BN [S. 590; R. 771].....	p 10.5-14.0 y	(9)
124	R = SCH ₃	c 8.4-10.0 v	(28)
125	R = SC ₂ H ₅	c 8.6- 9.8 v	(28)
126	R = SC ₆ H ₅	c 9.0-10.0 v	(28)

SULFONPHTHALEINS

127	Catecholsulfonphthalein.....	p 0.2- 0.8 o y 4.0- 7.0 g v 8.5-10.2 b	(41)
128	<i>m</i> -Cresolsulfonphthalein; Metacresol purple.....	{ r 0.8- 2.4 y y 7.6- 9.2 pu	{ (11, 14)
129	Thymolsulfonphthalein; Thymol blue.....	{ r 1.2- 2.8 y y 8.0- 9.6 b	{ (11, 14)
130	Tetranitrophenolsulfonphthalein.....	2.8- 3.8?	(11)
131	Tetrabromophenolsulfonphthalein; Bromphenol blue.....	y 3.0- 4.6 b	(11, 14)
132	*Tetrachlorophenolsulfonphthalein.....	y 3.0- 4.6 b	(11)
133	*Dichloro-dibromo-phenol-sulfonphthalein; Brom-chlorphenol blue.....	y 3.2- 4.8 b	(14)
134	Tetrabromo- <i>m</i> -cresolsulfonphthalein; Bromcresol green.....	y 3.8- 5.4 b	(11, 14)
135	Dichlorophenolsulfonphthalein; Chlorphenol red.....	y 5.0- 6.6 r	(11, 14)
136	Dibromo- <i>o</i> -cresolsulfonphthalein; Bromcresol purple.....	y 5.2- 6.8 pu	(11, 14)
137	Dibromophenolsulfonphthalein; Bromphenol red.....	y 5.4- 7.0 r	(11, 14)
138	*Diiodophenolsulfonphthalein.....	y 5.7- 7.3 pu	(9)
139	Dibromothymolsulfonphthalein; Bromthymol blue.....	y 6.0- 7.6 b	(11, 14)
140	*Brom Xylenol Blue, dibrominated No. 145.....	y 6.0- 7.6 b	(11, 14)
141	Phenol-nitrosulfonphthalein.....	y 6.6- 8.4 pu	(11)

SULFONPHTHALEINS.—(Continued)

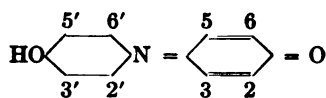
Index No.	Indicator	Color and useful range pH	Lit.
142	Phenolsulfonphthalein; Phenol red	y 6.8–8.4 r	(11, 14)
143	o-Cresolsulfonphthalein; Cresol red	y 7.2–8.8 r	(11, 14)
144	Salicylsulfonphthalein	y 7.2–9.2 p	(9)
145	*1.4-Dimethyl-5-hydroxybenzenesulfonphthalein; Xylenol blue	y 8.0–9.6 b	(12)
146	α-Naphtholsulfonphthalein	y 7.5–9.0 b	(11)
147	Carvacrolsulfonphthalein	y 7.8–9.6 b	(11)
148	Orcinsulfonphthalein	y 8.6–10.0 fl	(11)
149	Nitro-thymolsulfonphthalein	v 9.2–11.5 y	(11)

QUINOLINE COMPOUNDS

150	α-(p-Dimethylaminophenylethylene)-quinoline ethiodide; Quinaldine red. Eastman Kodak Co. No. 1361	1.0–2.0	(36)
151	Quinoline blue (cyanin); 1, 1' Disoamyl-4, 4'-quinocyanine iodide [S. 611; R. 806]	c 7.0–8.0 v	(52, 54, 56)

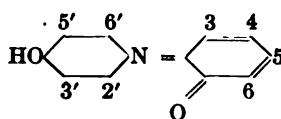
Index No. 152 INDOPHENOLS (15)

Color changes: from brownish or clear red in acid to deep blue in alkali. All indophenols are somewhat unstable



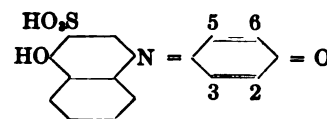
Indophenol

Substituents	pK
2, 6, 3' Tribromo-	5.1
2, 6-Dibromo-3'-chloro-	5.4
2, 6-Dibromo-3'-methyl-	5.4
2, 6-Dichloro-3'-chloro-	5.8
2, 6-Dichloro-3'-methyl-	5.5
2, 6-Dibromo-3'-methoxy-	5.6
2, 6-Dichloro-	5.7
2, 6-Dibromo-	5.7
2, 6-Dibromo-2'-methyl-	5.9
2, 6-Dibromo-2'-bromo-	6.3
2-Chloro-	7.0
2-Bromo-	7.1
3-Bromo-	7.8
Indophenol	8.1
2-Methyl-	8.4
3-Methyl-	8.6
2-Methoxy-	8.7
2-Isopropyl-5-methyl-	8.8
2-Methyl-5-isopropyl	8.9



Orthoindophenol

Substituents	pK
3' Bromo-	7.1
Orthoindophenol	8.4
2'-Methyl-	8.8



Indonaphthol-2'-sulfonic acid

Substituents	pK
2, 6 Dichloro-	6.1
Indonaphthol-2'-sulfonic acid	8.7
2-Methyl-	9.0

AZINES

Index No.	Indicator	Color and useful range pH	Lit.
153	Safranine (Which?)	b –0.3–1.0 r	(50)
154	Amino-dimethylamino-phenyl-diphenazonium chloride; Methylene violet B.N. [S. 680; R. 842]	pu 0.0–1.2 v	(9)
155	Amino-phenylamino-p-tolyl-ditolazonium sulphate; Mauve [S. 688; R. 846]	0.1–2.9	(56)
156	Magdala red; Mixture amino- and diamino-naphthyl-dinaphthazonium chlorides [S. 694; R. 857]	p 3.0–4.0 fl	(50)
157	Induline, spirit soluble [S. 697; R. 860]; Mixture	b 5.6–7.0 v	(9)
158	Amino-dimethylamino-toluphenazonium chloride; Neutral red [S. 670; R. 825]	r 6.8–8.0 y	(56)
159	Dimethylamino-phenyl-naphtho-phenazonium chloride; Neutral blue [S. 676; R. 832]	9.3–10.2	(52, 54, 56)

OXAZINE COMPOUNDS

160	Dihydroxy-dinaphthazoxonium sulfonate; Alizarin green B [S. 657; R. 918]	{ v –0.3–1.0 p y 12.0–14.0 br }	{ (60)
161	Diethylamino-benzylamino-naphtho-phenazoxonium chloride; Nile blue 2B [S. 654; R. 914]	b 7.2–8.6 p	(9)
162	Diethylamino-aminonaphtho-phenazoxonium sulfate; Nile blue A [S. 653; R. 913]	b 10.2–13.0 p	(9)

ANTHRAQUINONE COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
163	1, 2-Dihydroxy-anthraquinone- β -quinoline; Alizarin blue ABI [S. 803; R. 1066].....	p 0.0- 1.6 y y 6.0- 7.6 g	(9)
164	1, 2, 4-Trihydroxy-anthraquinone; Purpurin [S. 783; R. 1037].....	y 0.0- 4.0 o o 4.0- 8.0 p	(9)
165	Alizarin sulfonic acid; Alizarin red S [S. 780; R. 1034].....	y 3.7- 4.2 p	(67)
166	1, 2-Dihydroxy-anthraquinone; Alizarin [S. 778; R. 1027].....	y 5.5- 6.8 r v 10.1-12.1 pu	(53, 54, 56)
167	Alizarin blue S.....	various 6-14	(45)

INDIGOS

168	Indigo disulfonate; Indigo carmine [S. 877; R. 1180].....	b 11.6-14.0 y	(9)
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MISCELLANEOUS AND NATURAL INDICATORS

169	Echtrot?	y 0 - 1.0 r	(50)
170	Logwood [S. 938; R. 1246].....	various 0-14	(45)
171	*Red cabbage extract.....	r 2.4- 4.5 g	(65)
172	1-Oxynaphtho-quinomethane; Nierenstein's indicator.....	c 2.7- 3.7 pu	(67)
173	Tröger and Hille's Indicator, C ₁₄ H ₁₄ N ₄ SO ₃ H.....	o 2.8- 3.9 y	(67)
174	Phenacetolin.....	y 3.0- 6.0 r r 10.0-13.0 c	(45)
175	Lacmosol.....	r 4.4- 5.5 b	(26)
176	Lacmoid [R. 908 note].....	r 4.4- 6.2 b	(53, 54, 56)
177	Azolitmin (litmus) [R. 1242].....	r 4.5- 8.3 b	(53, 54, 56)
178	Cochineal [S. 932; R. 1239].....	y 4.8- 6.2 v	(53, 54, 56)
179	Archil (orchil) [S. 934; R. 1242].....	p 5.6- 7.6 v	(9)
180	Brazilein [S. 935; R. 1243].....	c 6.0- 8.0 p	(9)
181	Di- <i>o</i> -hydroxy-styryl ketone; Lygosine.....	y 7.3- 8.7 g	(67)
182	Mimosa flower extract.....	7.7- 9.6	(67)
183	Turmeric (curcuma) [S. 927; R. 1238].....	y 7.8- 9.2 br	(31)
184	Alkannin [R. 1240, note] <i>cf.</i> alizarin.....	8.3-10.0	(53, 54, 56)
185	α -Naphtholbenzein.....	y 8.5- 9.8 g	(53, 54, 56)

COMMON SYNONYMS OF INDICATORS

Among synonyms given in this table are several which apply to dyes which are not listed in preceding table or which have been applied to two or more of the indicators listed. Such cases are indicated by*.

Acid bordeaux, 77
Acid brown R,* 68
Acid fuchsin,* 107
Acid magenta II, 107
Acid roseine, 107
Alizarin, 166
Alizarin blue ABI, 163
Alizarin blue S, 167
Alizarin blue X, 163
Alizarin carmine, 165
Alizarin green B, 160
Alizarin red S, 165
Alizarin sulfonate or S, 165
Alizarin yellow GG, 74
Alizarin yellow R, 75
Alkali blue 4B, 104
Alkanet, 184
Alkanin, Alkannin, 184
Alphanaphtholbenzein, 185
Alphanaphtholphthalein,* 116
Amido-*aso*-benzol, 30
Amido-*aso*-toluol, 26
Amino-*aso*-benzene, 30
Amino-*aso*-toluene, 26
Amyl red, 66
Anchusin, 184
Aniline orange,* 31
Aniline red, 99
Aniline yellow,* 3, 25, 30
Archil, 179
Aurin, 103
Azo blue, 88

Azolitmin, 177
Azoresorcin, 101
Benzopurpurin B, 85
Benzopurpurin 4B, 86
Benzyl violet, 97
Beta naphthol orange, 73
Bitter almond oil green, 91
Blauholz, 170
Boettger's indicator, 184
Bordeaux B, 77
Brazilein, brasilin, brasilin, 180
Brasil wood, 180
Brilliant green, 93
Brilliant yellow,* 89
Brom-chlor-phenol blue, 133
Brom cresol green, 134
Brom cresol purple, 136
Brom phenol blue, 131
Brom phenol red, 137
Brom thymol blue, 139
Brom xylenol blue, 140
Butter yellow,* 26, 37
Cabbage red, 171
Campeachy wood, 170
Carmine, 178
Carminic acid, 178
Catechol sulphonphthalein, 127
China blue, 102
Chlor phenol red, 135
Chrome printing orange R, 75
Chrome printing yellow G, 74
Chrysoidine,* 56

Chrysoine, 78
Coccus, 178
Cochenille, cochineal, 178
Congo, 87
Congo red, 87
Corallin, 103
Cresol red, 143
Cresolphthalein,* 119
Cresolsulphonphthalein,* 143
Crismer's indicator, 101
Crocein,* 80
Crystal violet, 90
Curcuma, 183
Curcumin,* 84
Curcumin,* 183
Curcumin W, 89
Curcumin,* 183
Cyanin, 151
Dechan's indicator, 109
Degener's indicator, 174
Dianil red,* 87
Dichlorofluorescein, 114
Diethylaniline orange, 45
Dihydroxyanthraquinone, 166
Dimethylaniline orange, 44
Dimethyl orange, 44
Dimethyl yellow, 37
Dinitroaminophenol, 9
Dinitrohydroquinone, 5
Echtrot,* 169
Echtrot A, 76
Echtrot B, 77
Eosine, 110
Eosine BN, 123

Eosine YS, 110
Erythrosine,* 111
Ethyl green,* 96
Ethyl orange, 45
Ethyl red,* 60
Ethyl violet, 95
Fast red A, 76
Fast red B,* 77
Fluorescein, 113
Formanek's indicator, 160
Fuchsin, 154
Fuchsin,* 99
Fuchsin S, 107
Galeine, 109
Gallein, 109
Gentian violet, 98
Golden orange, 44
Haematein,* 1170
Haematoxylin,* 1170
Haematoxylin,* 1170
Helianthine,* 44, 81, 82, 83
Hematein,* 1170
Hematein,* 1170
Hematoxylin,* 1170
Henderson & Forbes' indicator, 5
Hersberg's indicator, 87
Hofmann's violet, 92
Holt & Reid's indicators, 124-126
Indigo carmine, 168
Indigo disulphonate, 168
Indophenols, 152
Induline spirit-soluble, 157
Iodeosine,* 111
Isopicramic acid, 9
Iodine green, 94
Kosmos red, 87

¹ Haematoxylin is the leuco-compound of Haematein or Hematein as obtained from logwood although the name is sometimes given to the oxidized form. Haematein or Hematein should not be confused with Hematin of the blood pigment.

Kroupa's indicator, 99
 Krüger's indicator, 113
 Lackmoid, laemoid, 176
 Lacomol, 175
 Lacmus, 177
 Litmus, 177
 Logwood, 170
 Luck's indicator, 120
 Lunge's indicator, 44
 Lygosine, 181
 McClendon's indicator, 11
 Magdala red, 156
 Magenta, * 99
 Malachite green, 91
 Manchester yellow, 3
 Martius yellow, 3
 Mauve, mauveine, 155
 Mellet's indicator, 70
 Meta cresol purple, 128
 Meta methyl red, 33
 Metanil yellow, 23
 Metanitrophenol, 15
 Methyl blue, * 105
 Methylene violet BN, 154
 Methyl green, * 96
 Methyl orange, 44
 Methyl red, 59
 Methyl violet 5B or 6B, 97
 Methyl yellow, 37
 Michaelis' nitro indicators, 1, 2, 4, 7, 8, 10, 12, 15
 Mimosa flower extract, 182
 Moir's "Improved methyl orange," 49
 Moir's polychromatic indicator, 127
 Monobenzyl orange, 32
 Monoethyl orange, 43
 Monoethyl red, 57
 Monomethyl orange, 42
 Monomethyl red, 55
 Monopropyl red, 58
 Naphthol bensein, 185
 Naphthol orange, 72
 Naphtholphthalein, * 115, 116
 Naphthylamine brown, 68
 Neutral blue, 159
 Neutral red, 158
 Nierenstein's indicator, 172
 Nile blue A, 162
 Nile blue B, 161
 Nitramine, 16
 Nitroaminoguaiacol, 11
 Nitrobenzene (tri), 17
 Nitrobenzoylene urea, 14
 Nitronaphthol, 3
 Nitrotoluene, 18
 Oil yellow, * 37
 Oil yellow B, 30
 Orange G, * 79
 Orange GG, 79
 Orange I, 72
 Orange II, 73
 Orange III, * 36, 44
 Orange IV, 25
 Orchil, 179
 Orseille, 179
 Parahelianthine, 44
 Para methyl red, 20
 Paranitrophenol, 12
 Paraphthalein, 120
 Pernambuco, 180
 Phenacetolin, 174

Phenol red, 142
 Phenolphthalein, 120
 Phenolsulphonphthalein, 142
 Phloxin red BH, 112
 Phosphine substitute, 78
 Picric acid, 1
 Poirrier's blue C4B, 106
 Poirrier's orange III, 44
 Propyl red, 61
 Purpurin, 164
 Pyrogallol phthalein, 109
 Quinaldine red, 150
 Quinoline blue, 151
 Red I, 76
 Red cabbage extract, 171
 Red violet 5R, * 92
 Red violet 5RS, 100
 Red wood, 180
 Resaurin, 101
 Resorcin blue, * 176
 Resorcin phthalein, 113
 Resorcin yellow, 78
 Rhodamine B, 108
 Riegel's indicator, 87
 Rosaniline, 99
 Roseine, 99
 Rose magdala, 156
 Rosolane, 155
 Rosolic acid, 103
 Rothols, 180
 Rubine S, 107
 Safranin, * 153
 Salicyl yellow, * 74
 Schaal's indicator, 166
 Soluble blue 3M, 2R, 102
 Soluble red woods, 180
 Spirit yellow, 30
 Spirit yellow G, 30
 Spirit yellow R, 26
 Tetra brom fluorescein, 110
 T. N. T., 18
 Thymol blue, 129
 Thymolphthalein, 122
 Toluidine orange* (ortho), 39
 Toluidine orange* (meta), 47
 Toluylene red, * 158
 Töpfer's reagent, 37
 Tournesol, 177
 Tröger and Hille's indicator, 173
 Tropaeolin*, ? 69
 Tropaeolin D, 44
 Tropaeolin G, * 23, 72
 Tropaeolin O, 78
 Tropaeolin OO, 25
 Tropaeolin OOO No. 1, 72
 Tropaeolin OOO No. 2, 73
 Tropaeolin R, 78
 Turmeric, 183
 Turnsole, 177
 Uranin, 113
 von Müller's indicator?, 25
 Weesky's indicator, 101
 Water blue, 102
 XL Soluble blue, 105
 Xylenol blue, 145
 Xylenol phthalein, * 121
 Xylidine orange* (meta), 40
 Xylidine orange* (para), 48
 Yellow B, 37
 Yellow T, 78
 Zellner's indicator, 113

TABLE 3

A. CLARK AND LUBS' SELECTION OF INDICATORS SUPPLEMENTED BY COHEN (11, 14)

A = Cubic centimeters of 0.01N NaOH required per 0.1 g acid indicator to form sodium salt. Dilute to 250 cc for 0.04 % reagent. Use alcoholic solutions of methyl red (59) and cresolphthalein (119).

B = Approximate pH value of solution required for full "acid color" appertaining to range indicated.

C = Approximate pH value of solution required for full "alkaline color" appertaining to range indicated.

Index No.	A	B	C	Useful range pH	pK†
129	see below	conc. HCl	6	1.2-2.8	1.5
131	15.0	0	7	3.0-4.6	4.0
134	14.5	1	8	4.0-5.6	4.7*
59		?	9	4.4-6.0	[5.0]
135	23.5	3	10	5.0-6.6	6.2*
136	18.5	3	10	5.2-6.8	6.3
139	16.0	4	10	6.0-7.6	7.1
142	28.5	5	11	6.8-8.4	7.8
143	26.3	5	11	7.2-8.8	8.2
128	26.5	5	11	7.6-9.2	8.4*
129	21.5	6	12	8.0-9.6	8.9
119		6	12	8.2-9.8	[9.4]

* No salt and protein errors determined.

† pK values are weighted means of values found in (2, 7, 11, 14, 18, 20, 24, 24).

Representative Corrections of Colorimetric Readings with Indicators of Table 3A to Bring Readings to Electrometric pH

	Peptone-beef infusion	10 % gelatine sol.	2 % egg-white	Urine
131 Brom phenol blue.....	0.05			
59 Methyl red.....	-0.10		0.24	0.05
136 Brom cresol purple....	0.01	0.04		0.01
139 Brom thymol blue....	0.10	0.04		0.02
142 Phenol red.....	0.04	0.20		0.00
143 Cresol red.....	0.03	0.20		
129 Thymol blue.....	0.04	0.20		
119 Cresolphthalein.....	-0.03	0.20		

Corrections at different salt content [after Kolthoff (29)]

Thymol blue (acid range)	0.1N KCl.....	-0.06
	1.0N KCl.....	+0.05
Brom phenol blue	0.1N KCl.....	-0.05
	1.0N KCl.....	-0.35
Methyl red	0.5N NaCl.....	+0.10
Brom cresol purple	0.5N NaCl.....	-0.25
Phenol red	0.5N NaCl.....	-0.15
Thymol blue	0.5N NaCl.....	-0.17

With color match between a solution at 70° and a standard buffer at 20° the solution at 70° will have the pH of the standard corrected by the following values according to Kolthoff (28).

Thymol blue (acid range).....	0.0
Brom phenol blue.....	0.0
Methyl red.....	-0.2
Brom cresol purple.....	0.0 to +0.2
Phenol red.....	-0.3
Thymol blue (alk.).....	-0.4

Corrections in sea water of salinity S [parts per 1000] after Ramage and Miller 1925 (unpublished).

S.....	5	10	15	20	25	30	35
Cresol red.....	- .11	- .17	- .21	- .24	- .25	- .26	- .27

B. SØRENSEN'S SELECTION OF INDICATORS (56)

Index No.	Composition of test solution	Useful range pH	Sensitivity to neutral salts	Usefulness in presence of			Stability on standing
				True proteins	High conc. of products of proteolysis	Chloroform and toluene	
97	0.01 %–0.05 % aqueous.....	0.1–3.2	high	fair	good	with chloroform not, with toluene useful	acid solutions fade
155	0.01 %–0.05 % aqueous.....	0.1–2.9	high	fair	good	as above	as above
22	0.01 g in 1 cc <i>N</i> HCl + 50 cc alcohol + 49 cc water.....	1.2–2.1	low	not	fair	not	moderate
25	0.01 % aqueous.....	1.4–2.6	low	not	fair	good	good
23	0.01 % aqueous.....	1.2–2.3	low	not	fair	good	good
34	0.02 g in 1 cc <i>N</i> /10 HCl + 50 cc alcohol + 49 cc water.....	2.3–3.3	low	not	good	not	moderate
32	0.01 % aqueous.....	1.9–3.3	low	not	fair	good	good
35	0.01 % aqueous.....	2.6–4.0	low	not	fair	good	good
37	0.01 g 0.1 cc <i>N</i> /10 HCl + 80 cc alcohol + 20 cc water.....	2.9–4.0	low	not	good	not	moderate
44	0.01 % aqueous.....	3.1–4.4*	low	not	fair	good	good
53	0.01 g in 0.4 cc <i>N</i> /10 HCl + 30 cc alcohol + 70 cc water.....	3.7–5.0	low	not	good	not	moderate
50	0.01 g in 60 cc alcohol + 40 cc water	3.5–5.7	low	not	good	good	good
59	0.02 g in 60 cc alcohol + 40 cc water	4.2–6.3*	low	S.C.	good	good	moderate
12	0.04 g in 6 cc alcohol + 94 cc water	5.0–7.0*	moderate	good	good	good	good
158	0.01 g in 50 cc alcohol + 50 cc water.	6.8–8.0*	low	S.C.	good	S.C.	good
103	0.04 g in 40 cc alcohol + 60 cc water.	6.9–8.0	low	fair	good	fair	good
72	0.01 % aqueous.....	7.6–8.9	low	good	good	good	good
116	0.1 g in 150 cc alcohol + 100 cc water	7.3–8.7	moderate	S.C.	good	good	fair
120	0.05 g in 50 cc alcohol + 50 cc water.	8.3–10.0*	moderate	S.C.	good	good	good—fades in strong alkali
122	0.04 g in 50 cc alcohol + 50 cc water.	9.3–10.5	moderate	S.C.	good	good	fades in moderate alkali
75	0.01 % aqueous.....	10.1–12.1			good		good
78	0.01 % aqueous.....	11.1–12.7			fair		good

S.C. = useful in special cases.

* Apparent pK values referred to standard buffers: Methyl orange (44) 3.7 (34 cf. 60). Methyl red (59) see Table 3A (59, 60). Paranitrophenol (12) see Table 3C. Neutral red (158) 6.85 (34). Phenolphthalein see Table 3C.

Representative average corrections of colorimetric readings with indicators of Table 3B to bring readings to electrometric pH (see also Table 2).

Index No. of indicator	Corrections (after Sørensen (53))		Corrections in solutions containing salts
	In 2 % peptone 0.01–0.3 <i>N</i> salt	In 2 % egg-white 0.07–0.3 <i>N</i> salt	
97	–0.02	–0.19	
155	–0.04	–0.19	
22	–0.06	> –0.90	
25	–0.27	> –1.40	
23	–0.30	> –1.40	
34	+0.01	> –0.80	
32	–0.22	> –0.80	
35	–0.41		
37	–0.08	–0.53	
44	–0.18		0.1 <i>N</i> KCl, –0.08; 1.0 <i>N</i> KCl, +0.23 Kolthoff
53	–0.02		
50	–0.03	+0.15	0.5 <i>N</i> NaCl, +0.10 Sørensen
12	–0.06	–0.04	0.5 <i>N</i> NaCl, –0.15 Sørensen (–0.05 Kolthoff)
158	+0.13	+0.68	0.5 <i>N</i> NaCl, +0.09 Sørensen

Index No. of indicator	Corrections (after Sørensen (53))		Corrections in solutions containing salts
	In 2 % peptone 0.01–0.3 <i>N</i> salt	In 2 % egg-white 0.07–0.3 <i>N</i> salt	
103	+0.08	+0.44	0.5 <i>N</i> NaCl, –0.06 Sørensen
72	–0.12	+0.10	0.5 <i>N</i> NaCl, –0.12 Sørensen
120	–0.01	+0.18	0.5 <i>N</i> NaCl, –0.12 Sørensen (–0.17 Kolthoff)
122	+0.01	+0.40	
75		+0.29	
78		–0.30	0.1 <i>N</i> KCl, +0.38; 1.0 <i>N</i> KCl, +0.62 Kolthoff

C. MICHAELIS' SELECTION OF ONE-COLOR INDICATORS

Index No.	Useful range pH	Conc. % in H ₂ O	pK (Michaelis and coworkers (38, 39))			pK (Kolthoff (31) at 15° and 0.05 <i>M</i> salt)
			In low salt content	In 0.15 <i>M</i> salt	In 0.5 <i>M</i> salt	
1	0.03–1.3		[0.26]			
2	2.0–4.0	sat.	3.71 + 0.006 (15 – <i>t</i>)	3.59	3.41	3.58

C. MICHAELIS' SELECTION OF ONE-COLOR INDICATORS.—(Continued)

Index No.	Useful range pH	Conc. % in H ₂ O	pK (Michaelis and coworkers (38, 39))			pK (Koltthoff (31) at 15° and 0.05M salt)
			In low salt content	In 0.15M salt	In 0.5M salt	
4	2.6-4.4	0.05	4.08 + 0.006 (15 - t°)	3.98	3.88	3.95
7			4.87	4.76	4.71	
8	4.0-5.8	0.025	5.16 + 0.005 (15 - t°)	5.08	5.01	5.15
10			5.35	5.30	5.25	
12	5.6-7.6	0.10	7.22 + 0.011 (15 - t°)	7.22	7.17	7.03
15	6.8-8.6	0.30	8.35 + 0.008 (15 - t°)	8.24	8.19	8.30
120	8.0-10.0	0.04	[9.76] + 0.011 (18 - t°)	9.6	9.5	
74	10.0-12.0		[11.2] + 0.013 (20 - t°)			

TABLE 4

RELATION BETWEEN PERCENTAGE, A, OF AVAILABLE COLOR AND PH (AFTER MICHAELIS AND GYEMANT (38))

Phenolphthalein.....	18°	a	1.0	1.4	3.0	4.7	6.9	9.0
		pH	8.45	8.5	8.6	8.7	8.8	8.9
Phenolphthalein.....	18°	a	12.0	16.0	21.0	27.0	34.0	40.0
		pH	9.0	9.1	9.2	9.3	9.4	9.5
Phenolphthalein.....	18°	a	45.0	50.0	55.0	60.0	65.0	
		pH	9.6	9.7	9.8	9.9	10.0	
Phenolphthalein.....	18°	a	70.0	75.0	80.0	84.5	87.3	
		pH	10.1	10.2	10.3	10.4	10.5	
Alizarine yellow GG..	20°	a	13	16	22	29	36	46
		pH	10.0	10.2	10.4	10.6	10.8	11.0

HIGH VACUUM TECHNIQUE

SAUL DUSHMAN

SELECTED FORMULAE

 1. Amount of Gas Striking 1 Cm² per Sec—

$$m = \frac{1}{4} \rho \Omega = p \sqrt{\frac{M}{2\pi RT}}$$

 where ρ = density and Ω = average velocity

$$= 43.74 \times 10^{-6} \times p \sqrt{M/T} \text{ g cm}^{-2} \text{ sec}^{-1} \text{ (p in baryes)}$$

$$= 58.32 \times 10^{-3} \times p \sqrt{M/T} \text{ g cm}^{-2} \text{ sec}^{-1} \text{ (p in mm of Hg)}$$

 n = number of molecules

$$= 6.062 \times 10^{22} \frac{m}{M} = 2.653 \times 10^{19} \frac{p}{\sqrt{MT}} \text{ cm}^{-2} \text{ sec}^{-1} \text{ (p in baryes)}$$

$$= 3.535 \times 10^{22} p / \sqrt{MT} \text{ cm}^{-2} \text{ sec}^{-1} \text{ (p in mm of Hg)}$$

 2. Laws of Molecular Flow (Flow of Gases at Very Low Pressures).— Q = amount of gas flowing through any tube or opening in cm³ per sec

$$= \frac{p_2 - p_1}{W \sqrt{\rho_1}}$$

 where $p_2 - p_1$ = difference of pressure

 ρ_1 = density at 1 barye pressure

$$= \frac{M}{83.15 \times 10^6 T}$$

Alizarine yellow GG..	20°	a	56	66	75	83	88
		pH	11.2	11.4	11.6	11.8	12.0

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Arnold, *J*, 44: 489; 24. (²) Barnett and Barnett, *27*, 18: 127; 21. (³) Bishop, Kittredge and Hildebrand, *J*, 44: 135; 22. (⁴) Bjerrum, *9*, 17: 58, 389; 11. (⁵) Bjerrum, *106*, 21: 1; 14. (⁶) Bogert and Seatchard, *J*, 28: 1606; 16. (⁷) Brode, *J*, 44: 581; 24. (⁸) Clark, *The Determination of Hydrogen Ions*, 2nd. ed., 1922. (⁹) Clark, Cohen and Elvove, *O*; cf. (⁸). (¹⁰) Clark and Lubs, *141*, 28: 479; 16. (¹¹) Clark and Lubs, *229*, 2: 1, 109, 191; 17. (¹²) Cohen, A., *230*, 16: 31; 22. (¹³) Cohen, A., *230*, 17: 535; 23. (¹⁴) Cohen, B., *231*, 28: 199; 23. (¹⁵) Cohen, B., Gibbs and Clark, *231*, 29: 381, 804; 24. (¹⁶) Cohn, *Indicators and Test Papers*, 1914. (¹⁷) Csanyi, *9*, 27: 64; 21. (¹⁸) Fels, *9*, 10: 208; 04. (¹⁹) Gillespie, *232*, 9: 115; 20. (²⁰) Gillespie, *J*, 42: 742; 20. (²¹) Glaser, *Indikatoren der Acidimetrie und Alkalimetrie*, 1901. (²²) Hatfield, *J*, 44: 940; 23. (²³) Henderson and Forbes, *J*, 28: 687; 10. (²⁴) Holmes and Snyder, *J*, 47: 221, 226; 25. (²⁵) Holt and Reid, *J*, 44: 2333; 24. (²⁶) Hottinger, *205*, 66: 177; 14. (²⁷) Jariach, *205*, 124: 177; 22. (²⁸) Koltthoff, *70*, 40: 775; 21. (²⁹) Koltthoff, *70*, 41: 54; 22. (³⁰) Koltthoff, *233*, 29: 104; 22. 60: 949; 23. (³¹) Koltthoff, *Der Gebrauch von Farbinidkatoren*, 1923. (³²) Koltthoff, *70*, 42: 251; 23. (³³) Koltthoff, *70*, 42: 964; 23. (³⁴) Koltthoff, *70*, 42: 144; 24. (³⁵) McClendon, *227*, 21: 348; 24. (³⁶) McClendon, *141*, 29: 437; 24. (³⁷) Michaelis, *Die Wasserstoffionkonzentration*, 1914. (³⁸) Michaelis and Gyemant, *205*, 109: 165; 20. (³⁹) Michaelis and Krüger, *205*, 119: 307; 21. (⁴⁰) Michaelis and Misutani, *205*, 147: 7; 24. (⁴¹) Moir, *234*, 2: no. 2; 20. (⁴²) Moir, *234*, 6: no. 2; 23. (⁴³) Noyes, *J*, 28: 815; 10. (⁴⁴) Palitash, *Bull. Inst. Océanographie*, No. 409: 22. (⁴⁵) Pridaux, *The Theory and Use of Indicators*, 1917. (⁴⁶) Pridaux and Nunn, *J*, 125: 2110; 24. (⁴⁷) Ramage and Miller, *O*. (⁴⁸) Rowe, *Color Index*, 1924. (⁴⁹) Salemsky, *9*, 10: 204; 04. (⁵⁰) Salm, *7*, 27: 471; 06. (⁵¹) Seudder, *Electrical Conductivity and Ionization Constants of Organic Compounds*, 1914. (⁵²) Schults, *Farbstofftabellen*, 1923. (⁵³) Sørensen, *235*, 8: 1; 09. (⁵⁴) Sørensen, *205*, 21: 131, 201; 09. (⁵⁵) Sørensen, *205*, 22: 352; 09. (⁵⁶) Sørensen, *236*, 12: 393; 12. (⁵⁷) Sørensen and Linderstrøm-Lang, *235*, 18: no. 6; 24. (⁵⁸) Thiel, *196*, 16: 307; 11. (⁵⁹) Thiel and Dassel, *25*, 66: 1667; 23. (⁶⁰) Thiel, Dassel and Wülken, *237*, 18: 1; 24. (⁶¹) Thiel and Wülken, *23*, 126: 393; 24. (⁶²) Thiel, Wülken and Dassel, *23*, 126: 406; 24. (⁶³) Van Alstine, *232*, 10: 467; 20. (⁶⁴) Vincent, *La concentration en ions hydrogène et sa mesure par la méthode électrométrique*, 1924. (⁶⁵) Walbum, *205*, 42: 291; 13. (⁶⁶) Walbum, *205*, 197: 209; 20. (⁶⁷) Walpole, *230*, 5: 628; 14. (⁶⁸) Walpole, *4*, 165: 2501, 2521; 14.

 W = "resistance" of tube or opening

 For a circular opening (diam., d cm) in a thin plate

$$W = \frac{3.184}{d^3}$$

 For a tube of diameter d and length l

$$W = \frac{2.394l}{d^3} + \frac{3.184}{d^3}$$

 3. Speed of Exhaust (S) of Given Volume (v).—

$$S = \frac{v}{t} \log_e \frac{p_2}{p_1}$$

 For $p_2/p_1 = 10$, t in sec and v in cm³

$$S = \frac{2.303v}{t} \text{ cm}^3 \text{ sec}^{-1}$$

For pump exhausting through resistance

$$\frac{1}{S_o} = \frac{1}{S_p} + \frac{1}{F}$$

 where S_o = observed speed of exhaust,

 S_p = speed of pump through negligible resistance, and

 F = rate of flow through resistance (cm³/sec)

$$S = \frac{Q}{p_2 - p_1} = \frac{1}{W \sqrt{\rho_1}}$$

TABLE OF MOLECULAR DATA

	H ₂	He	N ₂	O ₂	A	Hg	CO	CO ₂	H ₂ O
Mean Free path (cm) at 25°C and 1 barye.	19.2	29.6	10.0	10.7	10.6	[3.24]*	9.92	6.68	[6.03]*
(1/d ²) × 10 ⁻¹⁶ (Number of molecules per cm ²)	1.74	2.74	1.01	1.11	1.19	1.11	0.98	0.92	1.19
Micrograms (10 ⁻⁶ g) of gas striking 1 cm ² per sec at 25°C and 1 barye.	3.597	5.062	13.42	14.33	16.01	35.89	13.42	16.81	10.76
Number of molecules striking 1 cm ² per sec at 25°C and 1 barye. Unit = 10 ¹⁶	1082	769.3	283.7	271.7	243.3	10.85	283.7	231.7	362.0

* Values in square brackets refer to 0°C. Note: 1 barye = 0.75 × 10⁻³ mm mercury. Values of mean free path calculated from viscosity coefficients.

RATE OF FLOW OF AIR AND HYDROGEN AT LOW PRESSURES AND 20°C

<i>l</i>	<i>d</i>	<i>W</i>	<i>F</i> (air)	<i>F</i> (H ₂)
1 cm	1 cm	5.58	5 204	197 10
10	1	27.12	1 070	40 53
1	0.1	2 712.4	10.70	40.53
10	0.1	24 258	1.196	3.60

(Note.—These relations are valid only for pressures so low that the mean free path is equal to or greater than *d*.)

DATA ON VARIOUS TYPES OF PUMPS

	<i>S_p</i> cm ³ sec ⁻¹	Fore pump pressure	Min. pressure attainable
Gaede rotary mercury.	100 (max.)	ca. 1 cm	10 ⁻⁴ mm
Gaede molecular.	1 400	0.01 mm	<10 ⁻⁶ mm
Gaede diffusion.	80	0.01 mm	<10 ⁻⁶ mm
Langmuir condensation (metal).	4 000	0.01 mm	<10 ⁻⁶ mm
Gaede two stage metal.	60 000	20 mm	<10 ⁻⁶ mm

Evolution of Gas from Glass.—For rate at which gas is evolved at different temperatures, v. R. G. Sherwood (*I*, 40:1645; 18) and J. E. Shrader (*2*, 13:434; 19).

Chemical Clean-up Reagents for Producing Low Pressures.—1. Charcoal in liquid air. 2. Ca or Mg volatilized in sealed-off device, cleans up all gases except those of group 0. 3. P₂O₅, efficient for water vapor. 4. Palladium black at low temperatures, very good for hydrogen.

SOME VAPOR PRESSURES AT LOW TEMPERATURES

Substance	<i>t</i> °C	<i>p</i> , mm	<i>p</i> , baryes
Hg.	-78	3 × 10 ⁻³	4 × 10 ⁻⁴
H ₂ O.	-111	0.75 × 10 ⁻⁴	1 × 10 ⁻³
CO ₂	-182	0.75 × 10 ⁻⁴	1 × 10 ⁻³
CO ₂	-193	0.75 × 10 ⁻⁶	1 × 10 ⁻⁴
CO.	-190	863	
CH ₄	-185.8	79.8	
C ₂ H ₄	-188	0.076	
C ₂ H ₆	-180	0.076	
Vaseline (Stopcock grease).	-190 (fresh liquid air)		<10 ⁻⁴

PSYCHOLOGICAL DATA PERTAINING TO ERRORS OF OBSERVATION

R. S. WOODWORTH

(Additional data pertaining to sight and hearing are given in other sections of International Critical Tables treating of the mechanical equivalent of light, colorimetry, and the physical aspects of audition. Consult index. Editor.)

SIGHT

Much of the available data pertaining to the sensitivity of the eye have been obtained under such conditions that the exact value of the stimulus cannot satisfactorily be determined. Some are expressed in terms of the illumination, others in terms of the brightness, of a screen; the latter procedure is to be preferred. If the illuminated screen were a perfect diffuser of the light, and also a perfect reflector, if illuminated from the front, or a perfect transmitter, if illuminated from the rear, then its brightness (*B*) expressed in millilamberts would be numerically equal to 0.1 of its illumination (*I*) expressed in meter-candles. In the following data, this relation has been used to reduce to the basis of *B*, data which have been given in terms of *I*. Although in many cases the screens surely did not possess the properties thus assumed, it seems probable that the error so introduced is of less importance than those arising from other sources. Data for reaction times will be found near the end of this report.

Spectral range (⁴¹) for daylight vision is $\lambda = 397\text{m}\mu$ to $760\text{m}\mu$; for twilight vision (illumination too low for color perception), $\lambda = 440\text{m}\mu$ to $670\text{m}\mu$.

Threshold value = minimum stimulus which can be visually perceived as light; the perception of form is not involved. For

white light and a thoroughly light-adapted eye, luminous area subtending an angle of 10°, it is that corresponding to a brightness of 0.1 millilambert (³⁷). For white light and a dark-adapted eye, it varies with the area of the luminous area and with the duration of stimulus as shown in Table 1.

TABLE 1.—THRESHOLD OF VISION FOR DARK-ADAPTED EYE (⁴⁵)

D = distance; θ = visual angle subtended by shortest dimension of area; *B* = brightness required for perception; *P* = power entering eye; *t* = duration of exposure. Diameter of pupil = 8.3 mm.

Unit of: Area = 1 cm²; *D* = 1 cm; *B* = 1 microlambert; *P* = 1 milliwatt = 10⁻¹⁰ erg sec⁻¹; *t* = 1 sec.

Form	Area	<i>D</i>	θ	<i>B</i>	<i>P</i>	<i>t</i>	<i>B</i> †
Star* . . .	0.00785	300	1.2'	7.20	17.1	0.002	0.362
Star* . . .	0.00785	150	2.30	2.60	24.8	0.006	0.098
Star* . . .	0.00785	35	9.8	0.24	42.1	0.011	0.0446
Square. . .	0.04	35	19.6	0.028	25.3	0.020	0.0239
Square. . .	0.25	35	50	0.006	62	0.034	0.0123
Square. . .	1.00	35	1° 30'	0.002	41	0.160	0.0071
Square. . .	4.00	35	3 16	0.001	02	0.250	0.0051
Square. . .	9.00	35	4 54	0.000	45	0.500	0.003 54
Square. . .	36.0	35	9 44	0.000	258	1.000	0.002 62
Square. . .	144.0	35	18 56	0.000	175	2.000†	0.000 77

* Circle, Diameter = 1 mm.

† If *t* = ∞, *B* = 0.000 45; *t* = 4, *B* = 0.000 63.

‡ For square, area = 9 cm², *D* = 35 cm, θ = 4.9°.

TABLE 2.—CHANGE IN THRESHOLD DURING ADAPTATION

Threshold = brightness (B) of a surface which can just be seen. Sensitivity (S) = $1/B$. In light adaptation, I = illumination to which dark adapted eye was subjected for the time t ; S was measured 10 sec after this exposure. Unit of: t = 1 min; B = 1 microlambert; S = 0.1 millilambert⁻¹; I = meter-candle.

Dark adaptation (28)				Light adaptation (24, 25)			
t	B	S	I	5	25	60	Day†
				S	S	S	S
0	100.	1		23 000	9950	5800	435
0.5	5.0	20		17 500	7440	3700	230
4	1.33	75	1	10 400	5200	3250	200
9	0.054	1850	2	8130	3360	2600	115
14	0.0096	10 400	3	5200	2740	2038	87
19	0.0038	26 000	6	3470	2040	1600	48
23	0.001 43	69 500	10	3000	1450	1130	40
26	0.001 56	94 700	15		1000	312	
31	0.000 57	174 000	60		95	36	
39	0.000 51	195 000	80		54	28	
51	0.000 48	208 000	110		54	24	
61	0.000 46	215 000					

* Following nearly complete light adaptation. Luminous surface was 10 cm in diameter and 57 cm from eye ($\theta = 10^\circ$).

† Following nearly complete dark adaptation. Luminous surface was 1 m square and 1 m from eye ($\theta = 45^\circ$); initial S , just before exposure to I , was 10 000 millilambert⁻¹.

‡ Moderate diffused day-light.

The rates of adaptation to darkness and to light are indicated in Table 2 in which are given the threshold values at various intervals (1) after removal from daylight, and (2) immediately (10 seconds) after removal from a specified exposure, the eye before exposure having been kept in darkness for 45 min. The visibility of monochromatic light varies with the wave-length, and the relative visibility of lights of different wave-lengths depends upon their intensities. (Figs. 1, 2.) For a large surface with a brightness of

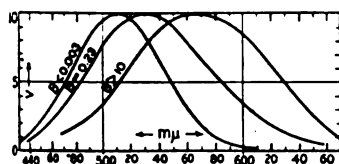


FIG. 1.—Relative visibility (V) (28, 46).

B = brightness, unit = 1 millilambert; abscissae = wave-lengths.

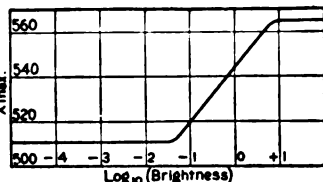


FIG. 2.—Position (λ_{max}) of maximum visibility (28, 46).

Unit of brightness = 1 millilambert.

5 to 80 millilamberts, the maximum visibility for the average observer, is near (9) $\lambda = 557.6$ mμ, but even normal subjects exhibit individual differences; out of 125 subjects, the percentage finding the maximum at each of the several wave-lengths was as follows (9):

λ	%	λ	%	λ	%	λ	%	λ	%	λ	%
549	2	553	4	557	12	561	2	565	2	569	0
550	2	554	7	558	13	562	3	566	2	570	2
551	5	555	9	559	12	563	2	567	0		
552	3	556	8	560	7	564	1	568	2		

All of the preceding refer to direct vision. The sensitivity of other portions of the retina is greater.

Complementary colors are those pairs of colors which, when superposed upon the retina in suitable proportions, produce the sensation of white. Grunberg states that if their wave-lengths are λ mμ, λ' mμ, then $(\lambda - 559)(498 - \lambda') = 424$, $\lambda > 559$, $\lambda' < 498$ (47); there are no complementaries to the colors in the range 498 mμ to 559 mμ.

Stable, or invariable, colors are those which do not change in hue, except to become gray, as they are moved from the fovea to the periphery of the retina. They are: yellow of $\lambda = 570$ mμ; bluish green of $\lambda = 490$ mμ; blue of $\lambda = 460$ mμ; and a non-spectral bluish red (21).

Discrimination of Brightnesses.—For large adjacent fields, differences of 1 % or even of 0.8 % in the brightness can be detected (31) if the brightness is of the order of 100 millilamberts. Under such

conditions the color of the light has no effect upon the discrimination. At lower brightnesses, the sensitiveness to change in brightness depends upon both the color and the brightness (Fig. 4).

Resolving power of the eye is the smallest angular separation at which two points, under the best illumination, can be seen as distinct. For different observers, it varies from 50'' to 93'' (20); the generally accepted normal value is 1'. It varies with the color of the light. In day-light and on a bright background, a dark line a few minutes long can be seen if it is 1.2'' wide; but, on a dark background, a bright line is not visible unless it is at least 3.5'' wide (48).

Aligning power, the ability to detect a lack of alignment of two similar, adjacent lines of the same width, as in setting a vernier, exceeds the resolving power. The average error (48) of skilled observers under best conditions corresponds to a visual error of not over 3''; in coincidence range-finders, the images can be aligned with an error not greater than 12'' and sometimes as small as 2''.

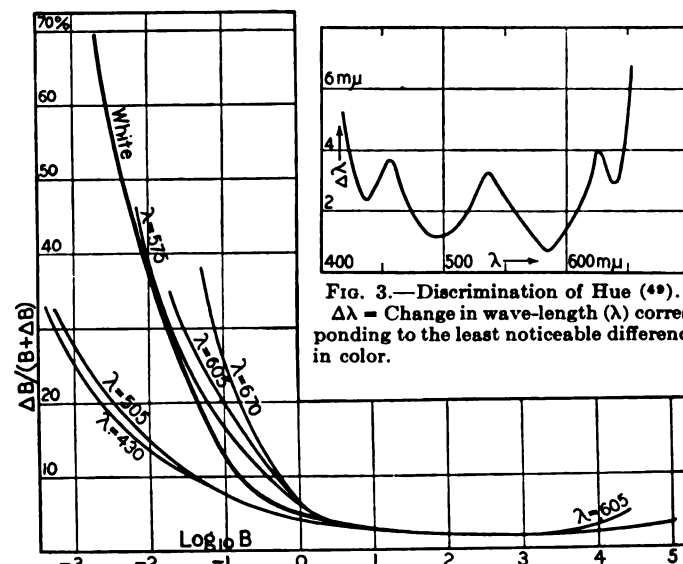


FIG. 3.—Discrimination of Hue (49). $\Delta\lambda$ = Change in wave-length (λ) corresponding to the least noticeable difference in color.

FIG. 4.—Discrimination of brightnesses (29, 46). ΔB = least noticeable increase in the brightness (B). Unit of B is 1 millilambert; of wave-length (Δ) is 1 mμ.

Acuity, or discrimination of form, is closely related to the resolving power, but differs from that in dealing, in general, with extended, interpenetrating, bright and dark areas, and frequently with low brightnesses. The *absolute acuity* (A) is the reciprocal of the smallest visual angle for which neighboring contrasted portions of the field can be seen as separated. Its variation with the brightness (B) of the brighter portions of the field is given by the equation (25) $A = c + k \log B$; the values of the constants c and k are determined by the units, the character of the field, and the eye; some values are given in Table 3. The unit commonly employed for A is 1 reciprocal minute.

TABLE 3.—ABSOLUTE ACUITY (A) AND BRIGHTNESS (B)

$$A = c + k \log_{10} B \text{ (cf. Fig. 5)}$$

Unit of: A = 1 minute⁻¹; B = 1 millilambert

Limits of B	c	k	Field	Lit.
0.01 to 43.5	1.05	0.415	Snellen and similar charts	(27)
40 to 1000	1.69	0.000	Snellen and similar charts	(27)
0.1 to 18	1.44	0.573	Snellen and similar charts	(12)
0.02 to 21	1.23	0.282	Crossed gratings	(8)
0.06 to 26	1.33	0.262	Crossed gratings	(7)

When the test field is a Snellen test chart, the acuity is commonly expressed as the ratio of the maximum distance (d_m), at which the characters can be distinguished, to the standard distance (d_s). This ratio (d_m/d_s) may be called the *Snellen acuity*; it is numerically equal to the reciprocal of the visual angle (in minutes) subtended by the sides of the elementary squares of the chart. As expressed in these units, the acuity of the average good eye exceeds 1.00; for the *E*-hooks, the mean of 100 subjects was 1.74, ranging from 1.00 to 2.45 (54).

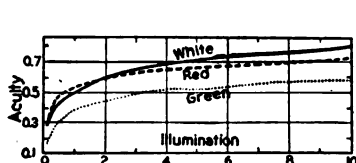


FIG. 5.—Acuity in white and in chromatic illumination (44). Unit of acuity = 1 Snellen unit; of illumination = 1 meter-candle.

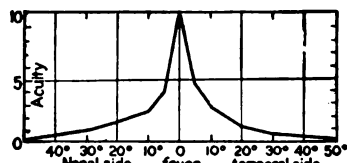


FIG. 6.—Relative acuity in direct vision (20). Abscissa indicates angular position of image upon the retina.

The effect of dark adaptation upon acuity may be obtained by determining, at various intervals (t) after the light adapted eye had been placed in darkness, the minimum illumination (I) in which it can distinguish Snellen test characters placed at a known distance. For a distance corresponding to a Snellen acuity of $\frac{1}{40}$ ($= 0.2$), the median¹ values of I for 6 observers having in daylight a Snellen acuity of $\frac{1}{4}$ ($= 1.5$) were found to be as follows (13):

t	0	5	10	15	25	35	45 minutes
I	1.09	0.79	0.56	0.40	0.34	0.42	0.42 meter-candles

The acuity depends also upon the color of the light, and upon the position of the image upon the retina. See Figs. 5, 6.

Detection of Differences in Length.—About 1% of the length is the least noticeable difference for simultaneously presented parallel lines which are relatively displaced (result of several old investigations). More recent work shows that a variable line, 1 to 5 cm long, can, by eye, be set to equality with a standard line with a probable error, for a single setting, of only 0.4%; for shorter lines the error is greater, attaining 0.5% for lines 1 mm long (36). When the time allowed for observation and judgment is short, the differences which can be detected with certainty are considerably greater. If the sign of the difference is to be judged correctly in 75% of the trials, then, for a 10 cm line, the difference must be 3.5 mm if the time is 4 seconds, and over 5 mm if the time is only 0.5 second (18).

Decimal Subdivision of a Small Distance.—When a fine line is set on a millimeter scale to successive positions in random order, and the subject is required to estimate its position to the nearest 0.1 mm, the average actual setting, for each tenth as estimated by 10 subjects (total of 6000 readings), for horizontal and for vertical scales was as follows (3, 52):

Estimate.....	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Horizontal.....	0.126	0.234	0.336	0.423	0.509	0.591	0.676	0.773	0.886	1.001
Vertical.....	0.106	0.202	0.308	0.395	0.486	0.576	0.652	0.757	0.875	0.992

The lines of the scale were presumably of the same width as the "fine line" of variable position. Settings were distributed over a length of 30 mm, the illumination was good, and the distance was that for best reading.

SENSES OTHER THAN SIGHT

Range of audible tones is from 18 to 18 600 double vibrations per second (44, 53); at high intensities the lower limit may be reduced

¹ For each value of t , the 6 observed values of I are arranged in order of magnitude; the mean of the third and the fourth of the values is by definition the median of the set.

to 12. At the upper limit, individuals varied from 15 000 to 22 000 d.v. per sec. As the age increases, the upper limit becomes lower (Fig. 7).

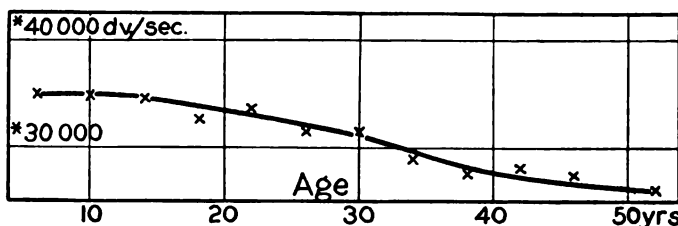


FIG. 7.—Dependence of highest audible tone upon age of subject (4).

* It is probable that these frequencies should be divided by two.

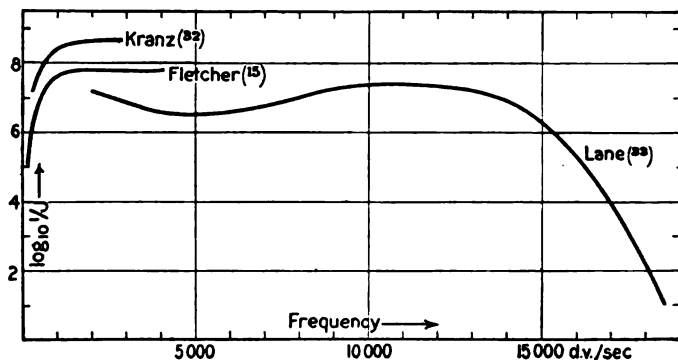


FIG. 8.—Aural sensitivity.

J = minimum audible power, unit = 1 erg cm⁻² sec⁻¹. Data in terms of effective, or r.m.s., pressure (P) in dynes cm⁻² have been reduced to erg cm⁻² sec⁻¹ (E) by means of the relation $P = \sqrt{dE} = 6.5\sqrt{E}$; d = density of air, v = velocity of sound in air, both in cgs units.

REACTION TIMES

The *simple reaction time*, or, briefly, the *reaction time*, is the interval which elapses between the application of a definite,

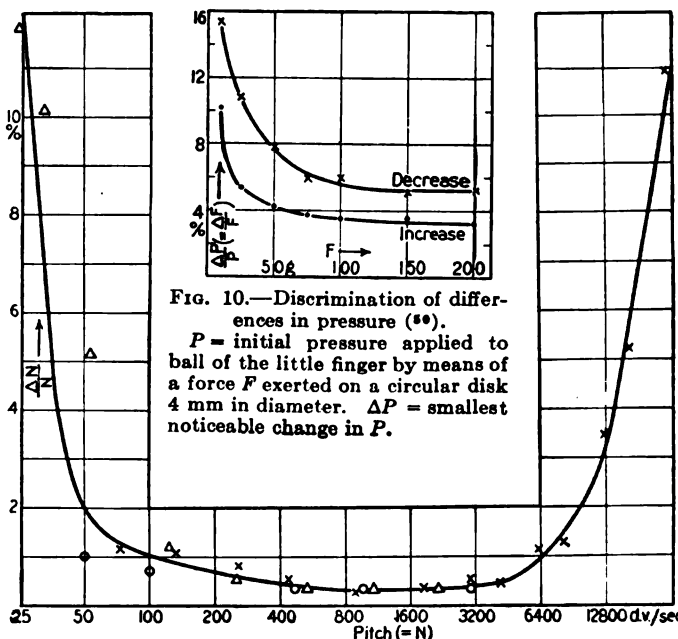


FIG. 9.—Discrimination of pitch.

N = number of double vibrations per sec; ΔN = smallest noticeable change in N . \circ = Knudsen (26), x = Stücker (51), Δ = Vance & Schaefer (52).

expected stimulus and the performance of a prescribed movement (usually a finger movement) indicating that it has been perceived.

Light.—For foveal stimulation of medium intensity, reaction time is 0.190 (± 0.008) sec; individuals range from 0.150 to 0.225 sec. It is the same for withdrawal as for initiation of stimulus (22). For faint stimulation, near threshold, interval is increased by 0.04 to 0.05 sec (16); reaction to withdrawal is 0.005 to 0.025 sec quicker than to initiation of stimulus (22). For photo-

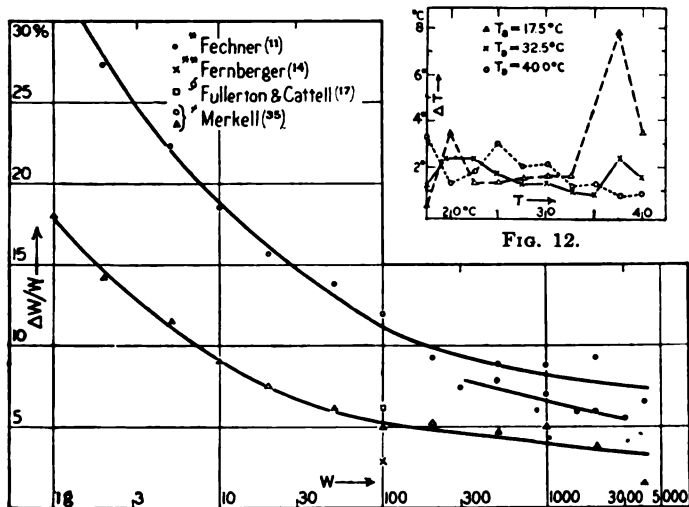


FIG. 11.—Discrimination of differences in lifted weights.

ΔW = smallest noticeable change in the weight W .

- * Weights had horizontal handles, were lifted successively with same hand.
- ** Cylindrical boxes lifted successively with same hand; ΔW is change for which 50 % of the estimates were of proper sign.
- † Cylindrical boxes lifted successively with same hand; ΔW is change for which 75 % of the estimates were of proper sign.
- ‡ Weights lifted by downward pressure of finger on a lever; several series of observations; curves represent the extremes.

FIG. 12.—Discrimination of differences in temperature (1).

Both hands were adapted by immersion in water of temperature T_0 ; they were then separately placed simultaneously in water at temperatures T and T_1 ; ΔT = least value of $(T_1 - T)$ which could be detected.

metrically equal stimuli of different colors, reaction time is independent of the color (22). Reaction time for eye to turn towards a stimulus in indirect vision is 0.151 sec (or 1.181 sec) if stimulus lies 1° (or 5°) from fixation point (10). For medium intensity, reaction time to monocular stimulation is about 0.015 sec greater than for binocular (43).

TABLE 4.—DISCRIMINATION REACTION TIME

Unit of: $T = 0.001$ sec; $L_1, L_2 = 1$ cm; $\lambda = 1\mu = 10\text{\AA}$

Position of squares* or circles†				Lengths‡ (21)			
Contrast (21)		Contrast (21)		T		T	
λ		λ		λ		λ	
Black and White.....		205		Red (640) and Orange red.....		627 270	
Red.....		640 222		Orange.....		614 257	
Orange.....		614 218		Yellow.....		585 237	
Yellow.....		585 211		Green.....		521 222	
Green.....		521 218		Blue.....		452 231	
Blue.....		453 226		Yellow and Green.....		521 232	
†Circles (24)		296		Blue.....		452 222	

* Two colored squares each 3 by 3 cm, placed side by side; observer was to react with corresponding hand to indicate on which side the previously specified square was placed. This type of discrimination reaction is the quickest. The same procedure was used in the discrimination of lengths.

† On a background of approximately 2.6 millilamberts and at a visual angle of 45° to each side of fixation point was a circle of angular diameter = $24'$, brightness = 3.5% greater than that of background. Either circle could be made to disappear, and the subject, by a reaction with the corresponding hand, indicated which disappeared.

Sound.—For finger reaction to sound of medium intensity, reaction time = 0.136 (± 0.002) sec; individuals range from 0.082 to 0.195 sec. For very faint sound, the interval is increased by 0.06 to 0.07 sec (16).

Touch.—For finger reaction to tactile stimulus of medium intensity, reaction time is 0.148 sec (23).

The *discrimination reaction time* is the interval which elapses between the application of one of two possible, definite, expected stimuli and the performance of the prescribed movement indicating which of the two stimuli has been applied. For printed letters, 10-point type, average for the alphabet, the reaction time for Roman capitals is 0.327 sec, Roman lower case 0.325, for short words 0.353, for long words 0.355, for small (1 cm square) pictures of familiar objects 0.336 sec (6). For other data, see Table 4.

Number Limitation and Span of Apprehension.—For college students, the greatest number of digits which an individual can repeat correctly immediately after a single auditory presentation averages 7.6 (5, 19), individuals range from 5 to 11 (5); for visual presentation the average is 8.0 (19).

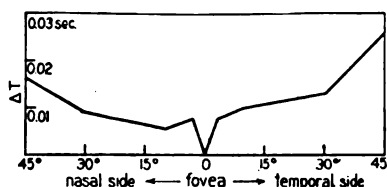


FIG. 13.—Reaction time for non-foveal stimulation (42).

ΔT = excess of reaction time over that required for foveal excitation. Abscissa indicates angular position of image upon the retina. Finger reaction.

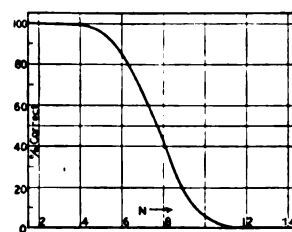


FIG. 14.—Span of apprehension (41).

N = number of dots exposed; ordinates = % of judgments which were correct.

When a number of black dots irregularly arranged upon a well illuminated white background were exposed to view for a very short interval (0.038 sec) and the subject was required to determine the number of dots presented, the average number of correct judgments made after considerable, but not extreme, practice was as shown in Fig. 14. The visual angle subtended by the dots was well above the threshold value.

LITERATURE

(For a key to the periodicals see end of volume)

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ARRANGEMENT OF CHEMICAL SUBSTANCES

Throughout I. C. T., except when otherwise indicated, the tabular arrangement of all chemical substances and of all systems capable of representation by formula is in accordance with a system called the "Standard Arrangement," which will now be explained and which should be learned by every user of I. C. T.

Elementary Substances

All tables containing *only* elementary substances (A-Tables) are arranged in alphabetical order of the symbols of the elements. In tables containing both elements and compounds (AB-Tables) the elements follow the "standard arrangement," *v. infra*.

Chemical Compounds and Other Systems Represented by Formula

The arrangement is based upon the following table of "Key-numbers" of the elements:

KEY-NUMBERS OF THE ELEMENTS										NOMBRES CLÉS DES ÉLÉMENTS															
-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(He	Ne	A	Kr	Xe	Rn)	O	H	F	Cl	Br	I	(85)	S	Se	Te	N	P	As	Sb	Bi	C	Po	Si	Ti	Ge
						46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
						Cr	Mo	W	U	V	Cb(Nb)	Ta	Pa	B	Al	Sc	Y	La	Ce	Pr	Nd	(61)	Sa	Eu	Gd
Ac	Ag	Al	As	Au		B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe
74	32	55	13	33		54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43
						Os	P	Pa	Pb	Pd	Po	Pr	Pt	Ra	Rb	Re	Rh	Ru	S	Sa	Sb	Sc	Se	Si	Sn
						35	12	53	23	41	17	60	37	80	84	34	40	39	8	63	14	56	9	18	22

To locate a given compound, first write its "key-formula," neglecting water of crystallization, thus:

Afin de situer un composé donné, il faut d'abord écrire sa "formule-clé," en négligeant l'eau de cristallisation, ainsi:

Compound	Composé	Na_2SO_4	$\text{HClO}_4 \cdot 3\text{H}_2\text{O}$	$\text{Hg}(\text{C}_{18}\text{H}_{15}\text{O}_2)_2$	$2\text{Fe}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$	$\text{Ni}_3\text{Pr}_2(\text{NO}_3)_{11} \cdot 24\text{H}_2\text{O}$	$\text{I}_2\text{C}_6\text{H}_4\text{SO}_3\text{H}$	$(\text{NH}_4)_2\text{CO}_3$
Key formula	Formule-clé	82-8-1	4-2-1	30-16-2-1	43-12-1	60-45-11-1	16-8-6-2-1	16-11-2-1

In writing a key-formula the key-numbers must be written in descending order.

All chemical compounds (B-Tables) are arranged in the inverse numerical order of their key-formulae. *Example:* to find the compound $\text{Hg}(\text{C}_{18}\text{H}_{15}\text{O}_2)_2 = 30 - 16 - 2 - 1$; First, turn to section 30 of the table. Then follow down the column of chemical formulae until element 16 (C) is first encountered. From this point continue until element 2 (H) is found, and then on until element 1 (O) is reached. At this point will be found all the compounds composed of the four elements Hg, C, H, and O and these compounds are arranged in an obvious manner according to the subscripts in the chemical formula. To facilitate the use of the tables, key-numbers are inserted at frequent intervals either along the top of the page or down the left hand column or both.

In looking for a chemical compound *always consult the B-Table*, the scope of which provides for *all* chemical compounds except those of the radioactive elements, of which only compounds of U, Th and Ra are given in the B-Table. For the others see p. 364. In certain of the B-Tables, at the point where key-formulae beginning with 16 occur, there will be found frequently only a few of the simpler compounds, and the reader will be referred to a

ARRANGEMENT OF CHEMICAL SUB-

ARRANGEMENT DES SUBSTANCES CHIMIQUES

L'arrangement tabulaire de toutes les substances chimiques et de tous les systèmes susceptibles d'une représentation par formule est, dans les T. C. I., excepté lorsqu'il y a une autre indication, en accord avec un système appelé "arrangement type," (standard arrangement) expliqué ci-dessous, qui devra être appris par chaque personne qui veut utiliser les T. C. I.

Substances Élémentaires

Toutes les tables ne contenant que les substances élémentaires (Tables A) sont arrangées dans l'ordre alphabétique des symboles des éléments. Dans les tables contenant les éléments et les corps composés (Tables AB) les éléments se trouvent suivant l' "arrangement type" voir *infra*.

Composés Chimiques et Autres Systèmes Représentés Par Formule

L'arrangement est basé sur la table suivante des "nombres clés" des éléments:

Lorsqu' on écrit une formule-clé, les nombres clés doivent être écrits dans l'ordre des valeurs décroissantes.

Tous les composés chimiques dans toutes les tables (Tables B.) sont arrangés d'après l'ordre numérique inverse de leurs formules-clés. *Exemple:* pour trouver le composé $\text{Hg}(\text{C}_{18}\text{H}_{15}\text{O}_2)_2 = 30-16-2-1$; il s'agit premièrement de chercher la section 30 de la table; ensuite de suivre en descendant la colonne des formules chimiques jusqu'à ce qu'on trouve l'élément 16 (C). De ce point, on continue jusqu'à ce qu'on rencontre l'élément 2 (H), et ensuite jusqu'à ce que l'élément 1 (O) soit atteint. On trouvera alors à ce point tous les composés renfermant les quatre éléments Hg, C, H et O et ces composés sont arrangés d'une manière appante en relation avec les indices de leurs formules chimiques. Afin de faciliter l'usage des tables, les nombres-clés sont inscrits, à de fréquents intervalles, ou au haut de la page ou le long de la colonne gauche, ou aux deux places.

Pour la recherche d'un composé chimique, il s'agit de *consulter toujours la Table B* dont le but est de renseigner sur *tous* les composés chimiques, à l'exception des éléments radio-actifs, dont seuls ceux de U, Th et Ra sont donnés dans la Table B. Pour les autres, voir p. 364. Dans certaines des Tables B, au point où les

STANCES AND SYSTEMS IN I. C. T.

DIE ANORDNUNG DER CHEMISCHEN VERBINDUNGEN

Durch die ganzen I. C. T., ausgenommen es ist etwas anderes angegeben, ist die tabellarische Anordnung aller chemischen Verbindungen und aller durch chemische Zeichen oder Formeln darstellbarer Systeme, nach der "Normal-Anordnung" (standard arrangement), durchgeführt. Sie ist im folgenden dargelegt und soll von jedem Leser der I. C. T. erlernt werden.

Elementare Stoffe

Alle Tafeln, welche nur elementare Stoffe (A-Tabellen) enthalten, sind in alphabetischer Reihenfolge nach den Symbolen der Elemente angeordnet. In den Tafeln, welche beides, Elemente und Verbindungen (AB-Tabellen), enthalten, folgen die Elemente der "Normal-Anordnung." Siehe weiter unten.

Die chemischen Verbindungen und andere durch Formeln darstellbare Systeme

Die Anordnung ist auf der folgenden Tafel begründet, welche die "Schlüsselnummern" der Elemente enthält:

SCHLÜSSELNUMMERN DER ELEMENTE

21	22	23	24	25	26	27	28	29	30
Zr	Sn	Pb	Th	Ga	In	Tl	Zn	Cd	Hg
66	67	68	69	70	71	72	73	74	75
Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ac	Be(Gl)

Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In
25	65	20	75	2	73	30	68	6	26

Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V
78	52	66	10	24	19	27	70	49	50

Um eine gegebene Verbindung aufzufinden, hat man zuerst seine Schlüsselformel aufzuschreiben, wobei man das Kristallwasser auslässt. z.B.:

Verbindungen	Composto	Na_2SO_4	$\text{HClO}_4 \cdot 3\text{H}_2\text{O}$	$\text{Hg}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$	$2\text{Fe}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$	$\text{Ni}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	$\text{I}_2\text{C}_6\text{H}_8\text{SO}_3\text{H}$	$(\text{NH}_4)_2\text{CO}_3$
Schlüssel-formel	Formula chiave	82-8-1	4-2-1	30-16-2-1	43-12-1	60-45-11-1	16-8-6-2-1	16-11-2-1

In die Schlüsselformel müssen die Schlüsselnummern in absteigender Reihenfolge geschrieben werden.

Alle chemischen Verbindungen (B-Tabellen) sind in der umgekehrten Reihenfolge der Schlüsselnummern angeordnet. Z. B.: Um die Verbindung $\text{Hg}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$, = 30-16-2-1 zu finden, hat man zuerst den Abschnitt 30 aufzusuchen. Dann hat man den Kolonnen der chemischen Verbindungen abwärts zu folgen, bis man zuerst das Element 16 (C) antrifft, von da an setzt man weiter fort, bis das Element 2 (H) gefunden ist und dann weiter, bis das Element 1 (O) erreicht ist. Bei dieser Stelle werden alle Verbindungen gefunden werden, welche sich aus den 4 Elementen Hg, C, H, und O zusammensetzen. Diese Verbindungen sind in deutlicher Art, entsprechend der Bezeichnungsweise chemischer Formeln, angeordnet. Um den Gebrauch der Tafeln möglichst zu erleichtern, sind die Schlüsselnummern häufig an verschiedenen Stellen eingefügt. Sie befinden sich entweder am Kopf der Seiten, oder auf der linken Seite unten, oder an beiden Stellen.

Um eine chemische Verbindung zu suchen, benütze man immer die B-Tabellen: die alle chemischen Verbindungen enthalten, ausgenommen jene der radioaktiven Elemente. Von diesen sind

ORDINE DI ELENCAZIONE DELLE SOSTANZE

In tutti i volumi delle T. C. I. l'ordine in cui le sostanze ed i sistemi rappresentabili con formule sono disposti nelle tabelle è (tranne che non sia diversamente indicato) quello "standard" illustrato più avanti. Chiunque voglia servirsi delle T. C. I. deve anzitutto apprendere in che consiste questo sistema "standard."

Sostanze Elementari

Tutte le Tabelle contenenti soltanto sostanze elementari (tabelle A) sono disposte secondo l'ordine alfabetico dei simboli degli elementi. Nelle tabelle che comprendono elementi e composti (tabelle A-B) gli elementi sono ordinati secondo la disposizione "Standard." v. *infra*.

Composti Chimici ed Altri Sistemi Rappresentati da Formule

La disposizione è basata sul quadro seguente di "numeri chiave" degli elementi.

NUMERI CHIAVE DEGLI ELEMENTI

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Cu	Ag	Au	Re	Os	Ir	Pt	Ma	Ru	Rh	Pd	Mn	Fe	Co	Ni
76	77	78	79	80	81	82	83	84	85	86				
Mg	Ca	Sr	Ba	Ra	Li	Na	K	Rb	Cs	(87)				

Ma	Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O
38	76	42	47	11	82	51	61	45	1

(61)	(75)	(85)	(87)
62	34	7	86

Per trovare il posto di un dato composto bisogna prima scrivere la formula chiave trascurando l'acqua di cristallizzazione, p. es.:

Nella formula chiave, i numeri chiave devono essere scritti in ordine decrescente.

Tutti i composti in tutte le tabelle (Tabelle B) sono disposti nell'ordine numerico inverso delle loro formule chiavi.

Supponiamo ad es. di voler trovare il composto $\text{Hg}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$, = 30-16-2-1. Prima si cerca la sezione 30 della Tabella, poi si scorre la colonna delle formule fino ad incontrare l'elemento 16 (C). Da questo punto si continua finché si trova l'elemento 2 (H), e quindi fino a raggiungere l'elemento 1 (O). Qui si trovano tutti i composti risultanti dai quattro elementi Hg, C, H e O ordinati secondo gli indici delle formule. Per facilitare l'uso delle tabelle i numeri chiave sono inseriti ad intervalli frequenti nella testata o lungo il margine sinistro della pagina, o nell'una e nell'altro.

Per cercare un composto bisogna sempre consultare la tabella B che contiene tutti i composti tranne quelli degli elementi radioattivi; di questi sono riportati nella tabella B soltanto i composti di U, Th, Ra. Per gli altri vedi p. 364. In alcune tabelle B, laddove si trovano formule chiave che cominciano con 16, si troveranno spesso soltanto pochi composti fra i più semplici e il lettore

C-Table where the remainder of such compounds will be found listed under a different arrangement known as

The C-Arrangement

In this arrangement the compounds are arranged according to their empirical formulae (including water of crystallization), in the order C, H, with the remaining symbols alphabetical, e.g., $C_6H_4I_2O_3S$. The C-Tables, however, will not contain any carbon compound whose key-formula contains a number greater than 16.

SYSTEMS OF MORE THAN ONE COMPONENT

The components of each system are first arranged according to the standard arrangement, giving the order A, B, C, etc. The systems are then arranged, according to the standard arrangement, in the order of their A-components. All systems having the same A-component will be found (under that component) in the order of their B-components, etc.

In certain tables, the above plan will be based upon the C-arrangement instead of the standard arrangement. Such cases will always be so indicated.

Name Indices

The chemical formulae of nearly all of the organic compounds and minerals whose properties are given in I. C. T. can be found with the aid of the extensive indices of names given on p. 174 and 280. If the name is not found there, other works of reference must be consulted for the formula. It should be noted, however, that the exact formula is not required. The compound can be readily located if only the elements composing it are known (in the case of inorganic compounds) or if only the number of carbon atoms are known (in the case of organic compounds) provided only that the user can recognize either name or formula when he sees it.

PHYSICAL PROPERTIES OF CHEMICAL SUBSTANCES

INTRODUCTION

The following tables (p. 96 to 314) are intended to serve as a source of ready reference for the *approximate* values of certain properties of chemical substances, displayed in such a manner as to be of the greatest utility. The values given may be uncertain by one or more units in the last significant figure. Non-significant figures are given in small type. Thus, 2300 indicates that the correct value lies between 1800 and 2800, with 2300 as most probable value.

More accurate values for these properties, if known, will be found in subsequent sections of I. C. T., together with their literature references.

A. ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR

A-Tables, p. 102. Values in parentheses are estimated, usually with the aid of the Periodic Law.

B. CHEMICAL COMPOUNDS. STANDARD ARRANGEMENT (v. p. 96)

B-Tables, p. 106

1. Formula or formula and name.
2. Gram-formula-weight. (I. C. T. atomic weights, v. p. 43.)
3. Crystal system.

B-Table.

Special tables.

formules-clés commençant par 16 se présentent, on ne trouvera fréquemment qu'un petit nombre de composés plus simples, et le lecteur sera alors renvoyé à une Table C, où le reste de ces composés se trouvera disposé d'une façon différente nommée

L'Arrangement C

Dans cet arrangement, les composés sont disposés en relation avec leurs formules empiriques (l'eau de cristallisation inclusive-ment) dans l'ordre C, H, les symboles restants venant ensuite dans l'ordre alphabétique; par ex: $C_6H_4I_2O_3S$. Cependant les Tables C ne contiendront aucun composé dont la formule-clé renferme un nombre supérieur à 16.

SYSTÈMES DE PLUS D'UN COMPOSANT

Les composants de chaque système sont premièrement disposés d'après l'arrangement type suivant l'ordre A, B, C, etc. Les systèmes sont alors arrangés, en accord avec l'arrangement type, dans l'ordre de leurs composants A. Tous les systèmes ayant le même composant A seront trouvés sous ce composant dans l'ordre de leurs composants B, etc.

Dans certaines tables, le plan sera basé sur l'arrangement C au lieu de l'arrangement type. De tels cas seront toujours mentionnés.

Noms Indices (Anglais)

Les formules chimiques de presque tous les composés organiques et les minéraux dont les propriétés sont données dans les T. C. I. peuvent être trouvées au moyen des indices extensifs des noms donnés aux p. 174 et 280.

Si l'on ne trouve pas le nom à cette place, il faudra consulter d'autres ouvrages de références pour la formule. Il faut noter, cependant, que la formule exacte n'est pas nécessaire. Le composé peut être immédiatement situé si l'on ne connaît que les éléments qui le composent (dans le cas des composés inorganiques), ou que les nombres des atomes de C (dans le cas des composés organiques); à la seule condition que le lecteur puisse reconnaître ou le nom ou la formule lorsqu'il la voit.

PROPRIÉTÉS PHYSIQUES DES SUBSTANCES CHIMIQUES

INTRODUCTION

Les tables suivantes (p. 96 à 314) ont été établies dans le but de servir de source de référence rapide pour les valeurs *approximatives* de certaines propriétés des substances chimiques, et sont disposées de manière à être de la plus grande utilité possible. Les valeurs données peuvent être incertaines par une ou plusieurs unités de leur dernier chiffre significatif. Les chiffres non significatifs sont donnés en petits caractères. Ainsi, 2300 indique que la valeur correcte se trouve entre 1800 et 2800, avec 2300 comme valeur la plus probable. Si l'on connaît des valeurs plus précises pour ces propriétés, on les trouvera dans les sections suivantes des T. C. I., accompagnées de leurs références bibliographiques.

A. SUBSTANCES ÉLÉMENTAIRES ET AIR ATMOSPHÉRIQUE

Tables A, p. 102. Les valeurs entre parenthèses sont estimées ordinairement à l'aide de la Loi périodique.

B. COMPOSÉS CHIMIQUES. ARRANGEMENT TYPE (v. p. 96)

Tables B, (p. 106)

1. Formule ou formule et nom.
2. Poids moléculaire en grammes (Poids atomiques des T. C. I., v. p. 43.)

in den **B**-Tabellen nur die Verbindungen des U, Th und Ra enthalten. Für die anderen siehe Seite 364. In einigen **B**-Tabellen, dort wo die Schlüsselnummern mit 16 beginnen, findet man häufig nur einige wenige einfache Verbindungen. Der Leser wird dann auf die **C**-Tabellen verwiesen, wo die restlichen derartigen Verbindungen gefunden werden können. Diese Tabellen sind nach anderen Gesichtspunkten zusammengestellt. Es ist das die

C-Anordnung (C-Arrangement)

Bei dieser Anordnung sind die Verbindungen nach ihrer empirischen Formel gegeben (einschliesslich Kristallwasser) und zwar in der Ordnung C, H, die restlichen Zeichen dann in alphabetischer Ordnung, z.B. $C_6H_4I_2O_2S$. Die **C**-Tabellen enthalten jedoch keine Kohlenstoffverbindung, in deren Schüsselformel eine Zahl grösser als 16 vorkommt.

SYSTEME MIT MEHR ALS EINER KOMPONENTE

Die Komponenten jedes einzelnen Systemes sind zuerst in der Reihenfolge A, B, C, u. s. w., entsprechend des "Standard-Arrangement" anzuordnen. Die Systeme sind dann, entsprechend des "Standard-Arrangement," in der Reihenfolge ihrer A-Komponenten angegeben. Alle Systeme, welche dieselbe A-Komponente haben, werden unter dieser Komponente in der Reihenfolge ihrer B-Komponenten gefunden.

In gewissen Tabellen wird dieser Plan entsprechend der **C**-Anordnung, an Stelle des "Standard-Arrangement," gewählt. Solche Fälle werden immer entsprechend bemerkt.

Namenverzeichnis (Englisch)

Die chemischen Formeln von so ziemlich allen organischen Verbindungen und Mineralien, deren Eigenschaften in den I. C. T. enthalten sind, können mit Hilfe des ausgedehnten Namenverzeichnisses auf Seite 174 und 280 gefunden werden. Ist der Name hier nicht auffindbar, so müssten andere Quellen für die Formel nachgesehen werden. Es soll aber bemerkt werden, dass eine genaue Formel nicht nötig ist. Die Verbindung kann bei anorganischen Verbindungen leicht aufgefunden werden, wenn nur die Elemente, die sie zusammensetzen, bekannt sind, bei organischen Verbindungen, wenn nur die Zahl der Kohlenstoffatome bekannt ist. Nötig ist es, dass der Leser entweder den Namen oder die Formel beim Ansehen erkennt.

DIE PHYSIKALISCHEN EIGENSCHAFTEN CHEMISCHER STOFFE

EINFÜHRUNG

Die folgenden Tafeln (s. 96 bis 314) sollen zur raschen Orientierung über angenäherte Werte gewisser Eigenschaften chemischer Verbindungen dienen. Sie sind in einer solchen Art angeordnet, um vom grösstmöglichen Nutzen zu sein. Die angegebenen Werte können auf einer und mehreren Stellen der letzten grossgeschriebenen Ziffer unsicher sein. Z.B. sagt die Zahl 2300 aus, dass der zwischen 1800 und 2800 liegende Wert am wahrscheinlichsten 2300 sein wird.

Genauere Werte für diese Eigenschaften können, wenn sie bekannt sind, in den weiter unten vorhandenen Abschnitten der I. C. T. zusammen mit der Literatur gefunden werden.

A. ELEMENTARE STOFFE UND DIE ATMOSPHERISCHE LUFT

A-Tabellen, Seite 102. Werte, die in den Klammern sich befinden, sind geschätzt gewöhnlich nach dem periodischem System der Elemente.

B. CHEMISCHE VERBINDUNGEN. NORMAL-ANORDNUNG [STANDARD-ARRANGEMENT] (siehe S. 97)

B-Tabellen, Seite 106

1. Formel oder Formel und Name.
2. Gramm-Formel-Gewicht (Atomgewichte der I. C. T. siehe S. 43.)

sarà rimandato a una tabella **C** dove si troveranno gli altri disposti con criterio differente che viene chiamato

La Disposizione C

Secondo questa i composti sono disposti in base alle formule empiriche (*compresa* l'acqua di cristallizzazione) nell'ordine C, H e con i rimanenti simboli ordinati alfabeticamente P. es. $C_6H_4I_2O_2S$. Le tabelle **C** non comprendono però composti del carbonio che hanno un numero chiave più grande di 16.

SISTEMI DI PIU' D'UN COMPONENTE

I *componenti* di ciascun sistema sono dapprima disposti secondo la disposizione tipo, nell'ordine A, B, C, etc. I *sistemi* sono quindi disposti, secondo la disposizione tipo, nell'ordine dei loro componenti A. Tutti i sistemi aventi lo stesso componente A verranno trovati, sotto questo componente, nell'ordine dei loro componenti B, etc.

In alcune tavole il piano sarà basato sulla disposizione **C** in luogo della disposizione tipo. Di ciò verra' sempre fatta menzione.

Indici Per Nome (Inglese)

Le formule chimiche di quasi tutti i composti organici e minerali di cui sono riportate le proprietà nelle T. C. I. si possono trovare con l'aiuto di estesi indici di nomi dati a p. 174, e 280. Se negli indici non si trova il nome bisogna consultare altre opere per trovare la formula. Deve tuttavia notarsi che non è necessaria la formula esatta. Il composto può essere facilmente ritrovato se si conoscono solo gli elementi componenti (nel caso di composti inorganici) o se si conosce solo il numero di atomi di carbonio (nel caso di composti organici) purchè il lettore sia in grado di riconoscerne il nome o la formula quando li vede.

PROPRIETA' FISICHE DELLE SOSTANZE

INTRODUZIONE

Le tabelle seguenti (p. 96 a 314) hanno lo scopo di fornire per una serie di sostanze valori *approssimati* di certe proprietà disposti in modo da essere della più grande utilità. I valori riportati possono essere incerti per una o più unità nelle ultime cifre significative. Le cifre non significative sono indicate in caratteri piccolli. Così 2300 indica che il valore esatto si trova fra 1800 e 2800, e che 2300 è il valore più probabile.

Valori più precisi di queste proprietà quando sono conosciuti, sono riportati nelle sezioni successive delle T. C. I. insieme con le relative indicazioni bibliografiche.

A. SOSTANZE ELEMENTARI ED ARIA ATMOSFERICA

Tabelle A, p. 102. I valori fra parentesi sono calcolati generalmente con l'aiuto della legge periodica.

B. COMPOSTI, DISPOSIZIONE STANDARD (v. p. 97)

Tabelle B, p. 106

1. Formula oppure formula e nome.
2. Peso della formula in grammi. (T. C. I. pesi atomici v. p. 43.)
3. Sistema cristallino.
Tabella B.
Tabelle speciali.
4. Punto di fusione. (Alla pressione di una atmosfera, tranne che non sia diversamente indicato dalla soprascritta; così $125^{17\text{atm}}$ = fonde a 125° alla pressione di 17 atmosfere.)
Tabella B

4. Melting point. (Under 1 atm. unless otherwise indicated by superscript, thus $125^{17\text{atm}}$ melts at 125° under 17 atm.)

3-Table.

5. Boiling point. (Under 760 mm Hg unless otherwise indicated by superscript, thus 321^{125} = boils at 321° under 125 mm Hg.)

3-Table.

6. Density, g cm^{-3} . (At 20° unless otherwise indicated by superscript, thus 1.853^{40} = 1.853 g cm^{-3} at 40°C .)

3-Table.

7. Refractive index and dispersion, (n_D and $H_\beta - H_\alpha$) for 20° unless otherwise indicated.

ABBREVIATIONS AND CONVENTIONS

at. or atm.	atmosphere
C.	cubic or regular
d.	decomposes, e.g., d. 335 = decomposes at ca. 335° ; 335 d. = melts (resp. boils) at 335° with decomposition
diss.	a dissociation temperature
exp.	explodes
l.	liquid
H.	hexagonal
M.	monoclinic
P.	under pressure
s.	sublimation
s. d.	slight decomposition
R.	rhombic or orthorhombic
Tet.	tetragonal
Tr.	transition temperature
Tri.	triclinic
Trig.	trigonal
vac.	<i>in vacuo</i>
var.	variable

THE PROPERTY-SUBSTANCE TABLES

Following the General Tables will be found (p. 306) the Property-substance Tables, in each of which the substances, identified by Index Number, are arranged in ascending order of the values of the property, the intervals on the scale of values of the property being given in black-face type.

To Identify a Substance by Means of Its Properties.—Example: A liquid is found to have the following properties: B. P. = 81.1° at 745 mm, $d = 0.783$, $n_D = 1.347$. What is the substance? With the aid of Craft's rule, first correct the boiling point to 760 mm. If the general nature of the substance is unknown, put $c = 10^{-4}$ in the Craft's equation, $\Delta t = cT_B(760 - P)$. Thus in the present instance, we should have $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, and $t_B = 81.1 + 0.3^\circ = 81.4^\circ$. Next turn to the special B. P. (p. 310), d (p. 313), and n (p. 276) tables and read off from these tables the index numbers of substances having values of the above properties in the neighborhood of those for the unknown substance. Thus, for the present example, the following index numbers will be obtained: For B. P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; for d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; for n_D , 141, 168, 213. The only index number common to each of these properties is 168; and on turning to this index number in the General C-Table, we can readily identify our substance as acetonitrile. The identification can then be further checked by appropriate chemical tests, if desired.

3. Système cristallin.

Table 3.

Tables spéciales.

4. Point de fusion. (Sous 1 atm. à moins d'une indication par exposant, ainsi $125^{17\text{atm}}$ = fond à 125° sous 17 atm.)

Table 3.

5. Point d'ébullition. (Sous 760 mm Hg à moins d'une indication par exposant, ainsi 321^{125} = bout à 321° sous 125 mm Hg.)

Table 3.

6. Densité, g cm^{-3} . (A 20° à moins d'une indication par exposant, ainsi $1,853^{40}$ = g cm^{-3} à 40°C .)

Table 3.

7. Indice de réfraction, et dispersion (n_D et $H_\beta - H_\alpha$) à 20° à moins d'une indication.

ABRÉVIATIONS ET CONVENTIONS

at. ou atm.	atmosphère
C.	cubique ou régulier
d.	Se décompose, par ex., d. 335 = se décompose à environ 335° ; 335 d. = fond (resp. bout) à 335° avec décomposition
diss.	une température de dissociation
exp.	exploser
l.	liquide
H.	hexagonal
M.	monoclinique
P.	sous pression
s.	sublimation
s.d.	légère décomposition
R.	rhombique ou orthorhombique
Tet.	tétragonal ou quadratique
Tr.	température de transition
Tri.	triclinique
Trig.	trigonal
vac.	dans le vide
var.	variable

TABLES DES PROPRIÉTÉS DES SUBSTANCES

On trouvera (p. 306) à la suite des Tables générales, les Tables des Propriétés des Substances, dans chacune desquelles, les substances identifiées par leur Nombre-Index, sont arrangées dans l'ordre ascendant des valeurs de la propriété; les intervalles de l'échelle des valeurs de la propriété sont donnés en caractères gras.

Pour identifier une substance au moyen de ses propriétés.—Exemple: On a trouvé qu'un liquide a les propriétés suivantes: P.E. = 81.1° à 745 mm, $d = 0.783$, $n_D = 1,344$. Quelle est la substance? Au moyen de la règle de Craft, on corrige premièrement le point d'ébullition à 760 mm. Si la nature générale de la substance est inconnue, on pose $c = 10^{-4}$ dans l'équation de Craft, $\Delta t = cT_B(760 - P)$. Ainsi dans le cas présent, nous aurions $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, et $t_B = 81.1^\circ + 0.3^\circ = 81.4^\circ$. Ensuite on cherche dans les tables spéciales des P.E. (p. 310), des d (p. 313) et des n (p. 276) et on note les nombres-index des substances ayant les valeurs des propriétés ci-dessus dans le voisinage de celles de la substance inconnue. Ainsi, pour l'exemple présent, les nombres-index suivants seront obtenus: Pour le P.E., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; pour d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; pour n_D , 141, 168, 213. Le seul nombre-index commun à chacune de ces propriétés est 168; en revenant à ce nombre-index dans la Table générale C, et en notant les autres propriétés, on peut rapidement identifier notre substance comme étant acétonitrile. L'identification peut être alors poussée plus loin au moyen d'essais chimiques appropriés, si on le désire.

3. Kristall-System

3-Tabellen.

Besondere Tabellen.

4. Schmelzpunkt. (Bei 1 Atmosphäre: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese den Druck unter welchem der Schmelzpunkt angegeben ist. Es bedeutet $125^{17\text{atm.}}$: der Schmelzpunkt ist bei einem Druck von 17 Atm. bei 125° .)

3-Tabellen.

5. Siedepunkt. (Unter 760 mm Quecksilber: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl den Druck, unter welchem der Siedepunkt angegeben ist. Es bedeutet 321^{125} : der Siedepunkt liegt bei einem Druck von 125 mm Hg bei 321° .)

3-Tabellen.

6. Dichte, g cm^{-3} . (Bei 20°C : wird dem Wert eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl die Temperatur, für welche die Dichte angegeben ist. Es bedeutet 1.853^{40} : die Dichte bei 40° beträgt 1.853.)

3-Tabellen.

7. Brechungs-Index und Dispersion, (n_D und $H_\beta - H_\alpha$) für 20° , wenn nichts anderes angegeben ist.

ABKÜRZUNGEN UND ZEICHEN

at. oder atm.	Atmosphäre
C.	kubisch oder regulär
d.	zersetzt sich, z. B. d335 bedeutet, zersetzt sich bei <i>ungefähr</i> 335° ; 335d bedeutet, schmilzt (oder siedet) bei <i>ungefähr</i> 335° unter Zersetzung
diss.	Dissociations Temperatur
exp.	explodiert
l.	flüssig
H.	hexagonal
M.	monoklin
P.	unter Druck
s.	Sublimation
s.d.	schwache Zersetzung
R.	rhombisch oder orthorhombisch
Tet.	tetragonal
Tr.	Umwandlungstemperatur
Tri.	triklin
vac.	im Vacuum
var.	variabel

STOFF-EIGENSCHAFTS TAFELN

Den Haupttabellen folgend, findet man Seite 306 Stoff-Eigenschafts Tafeln. In jeder dieser Tafeln, in welcher die Stoffe durch ihre Indexzahlen bezeichnet sind, werden die Stoffe in aufsteigender Ordnung der Werte dieser Eigenschaften dargestellt. Die Intervalle an der Scala der Eigenschaftswerte sind in fettgedruckten Ziffern angegeben.

Die Erkennung eines Stoffes mit Hilfe seiner Eigenschaften.—

Beispiel: Es ist eine Flüssigkeit gefunden, welche folgende Eigenschaften hat: Siede-Punkt 81.1° bei 745 mm, $d = 0.783$, $n_D = 1.344$. Welcher Stoff ist das? Mit Hilfe der Regel von Craft corrigiere man zuerst den Siede-Punkt auf 760 mm. Ist die allgemeine Natur des Stoffes nicht bekannt, setze man $c = 10^{-4}$ in die Gleichung von Craft ein: $\Delta t = cT_B(760 - P)$. Im gegenwärtigen Falle ist also $\Delta t = 10^{-4} \times (81.1 + 275)(760 - 745) = 0.3^\circ$, wonach dann der Siede-Punkt $t_B = 81.1^\circ + 0.3^\circ = 81.4^\circ$ sich ergibt. Dann verwende man die Sd.P. Tabellen (Seite 310), die d -Tabellen (Seite 313) und die n -Tabellen (Seite 276), suche in diesen die Indexzahlen jener Stoffe heraus, deren oben genannte Eigenschaften solche Werte haben, die in der Nähe der Eigenschafts Zahlen des unbekannten Stoffes liegen. So erhält man für das gewählte Beispiel, folgende Indexnummern: für Sd. P. 130, 758, 727, 1612, 168, 277, 1535, 506, 792, für d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; für n_D 141, 168, 213. Die einzige Index-Nummer, die alle drei Eigenschaften vereinigt, ist 168. Diese Index-Nummer wird in der Haupt C-Tabelle aufgesucht; mit Beachtung noch anderer Eigenschaften kann man leicht die Flüssigkeit als Azetonitril erkennen. Die Identifizierung kann dann noch weiter durch eine chemische Untersuchung, wenn nötig, bestätigt werden.

5. Punto di ebollizione. (Alla pressione di 760 mm Hg tranne che non sia altrimenti indicato dalla soprascritta; così 321^{125} = bolle a 321° alla pressione di 125 mm Hg.)

Tabella 3.

6. Densità, g cm^{-3} . (A 20° , tranne che non sia altrimenti indicato dalla soprascritta; così 1.853^{40} = 1.853 g cm^{-3} a 40°C .)

Tabella 3.

7. Indice di rifrazione e dispersione (n_D e $H_\beta - H_\alpha$) per 20° tranne che non sia altrimenti indicato.

ABBREVIAZIONI E CONVENZIONI

at. oppure atm.	atmosfera
C.	cubico o regolare
d.	si decompone; per es. d335 = si decompone a <i>ca.</i> 335° ; 355d = fonde (o bolle) a 335° con decomposizione
diss.	una temperatura di dissociazione
exp.	esplode
l.	liquido
H.	esagonale
M.	monoclino
P.	sotto pressione
s.	sublimazione
s.d.	leggera decomposizione
R.	rombico od ortorombico
Tet.	tetragonale
Tr.	temperatura di trasformazione
Tri.	triclino
Trig.	trigonale
vac.	nel vuoto
var.	variable

LE TABELLE DELLE PROPRIETA' DELLE SOSTANZE

Seguendo le tabelle generali si troveranno (p. 306) le tabelle delle proprietà in ciascuna delle quali le sostanze, indicate col numero indice, sono disposte secondo l'ordine ascendente dei valori della proprietà. Gli intervalli nella scala dei valori della proprietà sono indicati in grassetto.

Identificazione di una sostanza a mezzo delle sue proprietà.—*Esempio:* si supponga che un liquido abbia le seguenti proprietà: B.P. = 81.1° a 745 mm, $d = 0.783$, $n_D = 1.344$. Che sostanza è?

Con l'aiuto della regola di Craft, bisogna anzitutto ridurre il punto di ebollizione a 760 mm. Se non si conosce la natura della sostanza bisogna mettere, nella equazione di Craft, $c = 10^{-4}$, $t = cT_B(760 - P)$. Così, nel caso nostro, si avrebbe $t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3^\circ$, e $t_B = 81.1^\circ + 0.3^\circ = 81.4^\circ$. Dopo bisogna guardare alle tabelle speciali per il B. P. (p. 310), per d (p. 313) e per n (p. 276), e ricavare da queste tabelle i numeri indici delle sostanze aventi valori delle suddette proprietà vicini a quelli della sostanza sconosciuta. Così, per il nostro esempio, si otterranno i seguenti numeri indici: per B.P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; per d , 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; per n_D 141, 168, 213. L'unico numero indice comune a ciascuna di queste proprietà è 168; tornando a questo numero indice nella Tabella Generale C, e osservando le altre proprietà, si può prontamente identificare la sostanza nel acetone.

La identificazione può quindi essere ulteriormente comprovata da appropriati saggi chimici, se si desidera.

ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR. A-TABLE

THE GASEOUS STATE

Chem. symb.	Standard density 0°, 1A _n g l ⁻¹	Density of the saturated vapor at the normal boiling point g l ⁻¹	Critical constants					Specific heat joules per gram atom at 15°	Viscosity $\eta = A \times 10^{-4}$ poises
	d_g	d_v	t_c °C	p_c atm.	d_c g cm ⁻³	C_p	A	t	
A	1.7824	5.89	-122.4	48.0	0.531	20.2	221	20	
As			>1400.						
Br			302.		1.18		155	20	
Cl	3.214		144.	76.	0.573	17.2	132	20	
F	1.695								
H	0.08987	1.33	-239.9	12.8	0.0310	14.55	88.7	20	
He	0.1785	(11.2)	-267.9	2.26	0.069	20.9	197	20	
Hg		0.020 at 320°	1650	3500	5.		494	273	
I			553.				184	124	
Kr	3.708	(8.3)	-62.6	54.2			248	20	
N	1.2506	4.61	-147.1	33.5	0.311	14.56	176.5	23	
Ne	0.9002	9.46	-228.7	26.9	0.484		312	20	
O	1.4290	4.74	-118.8	49.7	0.430	14.60	203.9	23	
O ₂	3.03 at -80°		-5.0 (67.)		0.54				
P			721.	100.					
Rn	9.73	(12.6)	104.4	62.4			229	20	
S			1040.						
Tl		14.8							
Xe	5.851	(9.7)	16.6	58.2	1.15		225	20	
Air	1.2930						284.2	20	

THE LIQUID STATE

Chem. symb.	Density g cm ⁻³	Thermal expansion $\frac{1}{v} \frac{dv}{dt} = A \times 10^{-4}$		Normal boiling point (s = "solid")		Latent heat of vaporization at t _B Kilo-joules per gram atom (s = "solid")
	d	t	A at t°	t _B	L _v	
A	1.402	-185.7	4500.	-183	-185.7	6.3
Ac					(>1700.)	
Ag	9.4	960.	110.	960-1200	1950.	249.
Al	2.40	658.	113.	658-1100	1800.	225.
As					615.s	139.s
Au	17.	1063.			2600.	368.
B					(2550.)	
Ba					1140.	361.
Be					(1500.)	
Bi	10.1	270.	122.	270-630	1450.	193.
Br	3.119	20.	1100.	0-30	58.78	15.0
C					4200.	600.
Ca					1170.	399.
Cb					(>3300.)	
Cd	8.0	320.	150.	320-540	767.	107.
Ce					1400.	
Cl	1.557	-33.6	1500.	-34	-34.6	10.0
Co					2900.	380.
Cr					2200.	320.
Cs	1.84	26.	370.	27-123	670.	73.
Cu	8.3	1083.	190.	1083-1295	2300.	467.

THE LIQUID STATE.—(Continued)

Chem. symb.	d	t	A at t°	t _B	L _v
F	1.11	-187.	3000.	-200	-187.
Fe	6.9	1530.			3000.
Ga	6.095	29.7			>1600.
Ge					(2700.)
H	0.0709	-252.7	13000.	-255	-252.7
	0.126	-268.9			
He	0.147	-270.8			-268.9
	d_{max}				
Hf					(>3200.)
Hg	13.546	20.	182.	20	356.90
I	4.00	107.	800.	107-150	184.35
In					>1450.
Ir					(>4800.)
K	0.83	62.	290.	62-150	760.
Kr	2.6	146.			-151.8
La					1800.
Li			180.	186-230	>1200.
Mg	1.57	650.	380.	650-800	1110.
Mn					1900.
Mo					3700.
N	0.808	-195.8	6000.	-195	-195.8
Na	0.93	97.5	280.	100-200	880.
Ne	1.204	-245.9			-245.9
Ni					2900.
O	1.14	-183.	4100.	-195	-183.00
O ₂	1.71	-183.	2000.	-183	-112.
Os					(>5300.)
P	1.745	44.5	520.	50-60	280.
Pa					(6200.)
Pb	10.3	327.	120.	327-825	1620.
Pd	11.	1550.			2200.
Pt	19.	1755.			4300.
Ra					(1140.)
Rb	1.475	38.5	340.	40-140	700.
Rh					(>2500.)
Rn	4.4	-62.			-61.8
Ru					(>2700.)
S	1.808	115.	430.	115	444.6
Sb	6.55	631.	100.	630-1050	1380.
Sc					(2400.)
Se					688.
Si					2600.
Sn	6.98	232.	100.	232-1600	2260.
Sr					1150.
Ta					(>4100.)
Te					1390.
Th					(>3000.)
Ti					(>3000.)
Tl	11.0	300.	140.	300-350	1650.
V					(3000.)
W					5900.
Xe	3.06	-109.1			-109.1
Yt					(2500.)
Zn	6.7	463.	150.	419-543	907.
Zr					(>2000.)
87					(620.)
85					(520.)

AIR

Mole % O ₂ in liquid	<i>d</i>	<i>t</i>	A at <i>t</i> °	<i>t_B</i>	<i>L_v</i>
10	0.831	-195.0		-195.0	0.185 (pergram)
20	.856	-194.3		-194.3	
20.94	.861	-194.2		-194.2	
30	.893	-193.5		-193.5	
40	.932	-192.6		-192.6	
50	.974	-191.5		-191.5	

Chem. symb.	Specific heat joules per gram atom		Electrical resistivity ohm-cm <i>R</i> = <i>A</i> × 10 ¹¹		
	<i>C_p</i>	<i>t</i>	<i>A</i>	<i>n</i>	<i>t</i>
A	22.4	-100.			
Ag	33.8	907-1100	17.0	-6	1000.
Al	28.	660	20.1	-6	657.
Au	27.	1100	30.8	-6	1063.
Bi	31.	400	127.		269.
Br	36.	13-45	7.8	12	17.
Cd	36.	321	34.	-6	400.
Cl	33.5	0-24	>10.	15	-70.
Cs	32.	50	36.6	-6	28.
Cu	27.	1084	21.3	-6	1083.
Ga	23.	119	27.	-6	30.
H	0.975	-252			
Hg	27.9	20	95.8	-6	20.
I	8.01	114-185	78.	6	110.5
In			29.	-6	155.
K	30.	63	13.	-6	62.
Li			45.	-6	230.
N	27.8	-200			
Na	32.	100	9.7	-6	100.
Ni	33.	1452	109.		1500.
O	26.4	-200			

Chem. symb.	<i>C_p</i>	<i>t</i>	<i>A</i>	<i>n</i>	<i>t</i>
P			2.3	6	25.
Pb			98.	-6	400.
Rb	32.	50	23.5	-6	50.
S	30.4	100	95.	10	115.
Sb	28	630	12.	-6	860.
Se			76.6	-9	390.
Sn	31.	232	49.	-6	300.
Tl			74.	-6	300.
Zn			43.	-6	440.
Air	1.91*	-200.			

* Per gram, for liquid containing 20.94 mole % O₂.

SURFACE TENSION

Chem. symb.	γ dyne cm ⁻¹	<i>t</i>	Chem. symb.	γ dyne cm ⁻¹	<i>t</i>
A	12.5	-185.8	N	8.85	-195.8
Al	520.	750.	O	13.2	-183.
Bi	376.	300.	Pb	442.	350.
Br	36.	58.6	S	60.	120.
Cd	628.	350.	Se	72.	217.
Cl	27.	-34.5			
Ga	358.	30(CO ₂)	Air, with 50		
H	1.91	-252.7	mole % O ₂	11.6	-190.3
Hg	476.	20.			

REFRACTIVE INDEX

Chem. symb.	<i>n_D</i>	<i>t</i>	Chem. symb.	<i>n_D</i>	<i>t</i>
B	2.5*		N	1.2053	-190.
Br	1.661	15.	Na	0.0045	
Cd	0.82*		O	1.221	-181.
Cl	1.385	20.	Pb	2.6*	
H	1.097*	-252.8	S	1.929	110.
Hg	1.6-1.9	20.	Se	2.9	220.
N	1.1975*	-195.8	Sn	2.1	

* These values are for the Hg line 5790 Å.

THE CRYSTALLINE STATE

Chem. symb. (At. wt. v. p. 43)	Crystal system or form	Density, g cm ⁻³		Thermal expansion $\frac{1}{l} \frac{dl}{dt} = A \times 10^{-6}$		Melting point °C	Specific heat joules per gram atom 1 joule = 4.185 cal.		Latent heat of fusion at <i>t_F</i> Kilo- joules per gram atom	Electrical resistivity ohm-cm <i>R</i> = <i>A</i> × 10 ⁻⁶	
		<i>d</i>	<i>t</i>	<i>A</i> at <i>t</i> °			<i>t_F</i>	<i>C_p</i> at <i>t</i> °		<i>I_F</i>	<i>A</i>	t
A	C.	1.65	-233			-189.2	25.9	-223	1.12		
Ac						(1800.)					
Ag	C.	10.5	20	18.9	20	960.5	25.2	20	11.	1.62	20
Al	C.	2.702	20	23.03	20	660.0	24.2	20	8.0	2.62	20
As	Met.H.	5.7		4.7	20	814 ^{36atm}	25.8	0-100		35	0
	Black	4.7	20				27.0	0-100			
	Yel. C.	2.0	20								
Au	C.	19.3	20	14.2	20	1063.0	25.7	18	13.3	2.4	20
B		2.		2		2300.	14.	0-100		1.8 × 10 ¹²	0
Ba		3.5	20			850.					
Be	H.	1.8	20			1350.	16.1	0-100	12.	18.5	20
Bi	H.	9.80	20	13.3	20	271.	25.6	20	10.9	115	20
Br	R.	(3.4)				-7.2	23.5	-192 to -108	5.4	>10 ¹⁴	
C	Dia. C.	3.51	20	0.9	20		6.1	20		5 × 10 ²⁰	15
Graphite	C.	2.255	20	3	20	3500.	8.5	20		1400.	20
Graphite	Single crystal									39-60	20

THE CRYSTALLINE STATE.—(Continued)

Chem. symb.	Crystal system	d	t	A at t°		t_F	C_p at t°		L_F	A	t
Ca	C.	1.55	20	25.	0-21	810.	26.0	20		4.6	20
Cb		8.4	20			1950.					
Cd	H.	8.6	20	29.8	20	320.9	28	20	6.2	7.5	20
Ce	C.	6.90	20			640.	24.8	0-100		78	20
	H.	(6.7)									
Cl	R.	(1.9)				-101.6	28.	-113	3.40		
Co	C.	8.9	20	12.3	20	1480.	24.8	20	14.4	9.7	20
Cr	C.	7.1		8.2	20	1615.	23.	20	6.9	2.6	0
Cs		1.90	20	97.	0-26	26.	29.	20	2.1	20.	20
Cu	C.	8.92	20	16.6	20	1083.	24.5	20	11.5	1.69	20
F		(1.3)				-223.			(0.8)		
Fe	C.	7.86	20	11.7	20	1535.	24.9	20	11.2	10.0	20
Ga	Tet.	5.91	20	18	0-30	29.75	23	12-23	5.55	53	0
Ge	C.	5.36	20			958.5	22.3	0-100		89×10^3	0
H	C.	0.0808	-262			-259.14	2.4	-260.6	0.059		
He						< -272.2					
Hf						(1700)					
Hg	H.?	14.19	-38.9	90	-190 to -40	-38.87	28.0	-40	2.33	21.3	-50
I	R.	4.93	20	93	20-100	113.5	27.8	20	8.38	1.3×10^{15}	20
In	Tet.	7.3	20	33	20	155	27.3	0-100		9	20
Ir	C.	22.4	20	6.5	20	2350.	26.1	0-100		6.	20
K	C.	0.86	20	83.	20	62.3	29	14	2.38	7.0	20
Kr		(2)				-169			(1.5)		
La		6.15	20			826	26	0-100		59	18
Li	C.	0.53	20	56.	20	186	23	0	(3.5)	9.3	20
Ma						(2300)					
Mg	H.	1.74	20	25.6	20	651	25	20	7.13	4.46	20
Mn		7.2	20	23.	20	1260	24.6	0	8.4	5	
Mo	C.	10.2		4	20	2620 ± 10	26	20-100		4.77	20
N	C.	1.026	-252.5			-209.86	23	-212	0.356		
Na	C.	0.97	20	71	20	97.5	28.4	20	2.65	4.6	20
Nd		6.9	20			840	27	0-100		79.	20
Ne		(1.0)				-248.67			(0.24)		
Ni	C.	8.90	20	12.8	20	1452	25.8	20	18.17	6.9	20
O	H.	1.426	-252.5			-218.4	22.5	-221.8	0.22		
O ₃	Ozone					-251.					
Os	H.	22.48	20	6.1	20	2700.	25	20-100		9	20
P	Yel. H.	1.82	20	125.	0-40	44.1	23	9	0.654	10^{17}	11
	Red, C.	2.20	20			590^{atm}	24	-21 to +7			
	Black									710×10^3	0
Pb	C.	11.34	20	29.1	20	327.5	26.5	20	4.70	21.9	20
Pd	C.	12.0	20	11.8	20	1555.	26.2	18	16	10.8	20
Po						(1800.)					
Pr		6.5	20			940.	27	0-100		88	18
Pt	C.	21.45	20	8.9	20	1755.	26.5	20	22	10.5	20
Ra		(5.)				(960.)					
Rb		1.53	20	90.	20	38.5	28.7	0	2.18	12.5	20
Re						(3000)					
Rh	C.	12.5	20	8.4	20	1955.	25	0-100		5.1	20
Rn		(4.)				-71.			(3.25)		
Ru	H.	12.2	20	9.1	20	2450.	26	0-100		10.	20
S	R.	2.07	20	64.	40	112.8	23	0-30		2×10^{23}	20
	M.	1.96	20			119.0	24	0-30	1.18		
Sa		7.7				> 1300.					
Sb	H.	6.684	25	11.4	20	630.5	25	20	19.5	39.	20
Sc		(2.5)				1200.					
Se	Gray, Trig.	4.80	25	37	40	220.	28	0-41	(2.2)	1.2	20
	Red, H.?	4.50	25								
Si	C.	2.4	20	2.8-7.3	20	1420.	20.7	20		85×10^3	20
Sn	White, Tet.	7.31	20	20.	20	231.85	26.9	18	(7.)	11.4	20
	Gray, C.?	5.750	20	5.	-163 to -18		25.6	20			

THE CRYSTALLINE STATE.—(Continued)

Chem. symb.	Crystal system	d	t	A at t°		t_F	C_p at t°		L_F	A	t
Sr		2.6				800.				23.	20
Ta	C.	16.6		7	20	2850.	27	20		15	20
Te	α Met. H.?	6.24	20	16.8	40	452.	25	20	3.9	[5.8 — 33 $\times 10^3$]	
	β H.?	6.00	20								
Th	C.	11.2				1845.	26.8	0-100		18.	20
Ti	C.	4.5	20			1800.	29	0-100		3	20
Tl	Tet.	11.85	20	28	20	303.5	26.6	20	6.15	18.1	20
U		18.7				<1850.	28	0-100		60.	20
V	C.	5.96				1710.	24.6	0-100			
W	C.	19.3		4	20	3370.	26	20-100		5.48	20
Xe		(2.7)				-140.			(2.05)		
Yt		5.51				1490.					
Zn	H.	7.140	20	33	20	419.43	25.3	20	7.1	6	20
Zr	C.	6.4	20			1700.	25.2	0-100		170.	0
85						(470.)					
87						(23.)					

CHEMICAL COMPOUNDS

B-TABLE

Compiled with the cooperation of Raleigh Gilchrist, F. W. Smithers and Edward Wichers, Bureau of Standards, Washington D. C.; J. A. Almquist, J. M. Braham and E. W. Guernsey, Fixed Nitrogen Laboratory, Washington, D. C.; H. E. Merwin, H. S. Roberts, R. B. Sosman and E. G. Zies, Geophysical Laboratory, Washington, D. C.; John C. W. Frazer, F. O. Rice and H. C. Urey, Johns Hopkins Univ., Baltimore, Md.; Robert D. Coghill, Florence Fenwick, Donald M. Hetler, Norman W. Krase and Hugh M. Spencer, Yale Univ., New Haven, Conn. The list of minerals was supplied by E. T. Wherry, Bureau of Chemistry, Washington, D. C.

General index number	Formula	Molecular weight (I. C. T. atomic weights, v. p. 43)	Crystal system	Normal melting point, °C	Specific gravity 20°/4° (or at other indicated temperature)	Refractive index finding number, v. p. 165
1	H ₂ O.....	18.0154		0	0.917°	203
2	H ₂ O ₂	34.0154		— 1.7	l. 0.9982 1.643 ₄ ^{-4.48} l. 1.442	8 16
3	H ₂ O ₂ .2H ₂ O.....	70.0462		— 51		
4	HF.....	20.0077		— 83	l. 0.988 ^{12.6}	
5	Cl ₂ .8H ₂ O.....	215.039	R.	d. 9.6	1.23	
6	ClO ₂	67.4580		— 76		
7	Cl ₂ O.....	86.9160		— 20?		
7.1	Cl ₂ O ₆	166.916		— 1	1.65	
8	Cl ₂ O ₇	182.916				
9	HCl.....	36.4657		— 111	l. 1.194 ^{-55.8}	3
10	HCl.H ₂ O.....	54.4811		— 15.35	1.48	
11	HCl.2H ₂ O.....	72.4965		— 17.7	l. 1.46 ₄ ^{18.3}	
12	HCl.3H ₂ O.....	92.6119		— 24.4		
13	HClO ₄	100.466		— 112	l. 1.768	
14	HClO ₄ .H ₂ O.....	118.481		50	1.88 l. 1.776 ₄ ⁵⁰	
15	HClO ₄ .2H ₂ O.....	136.497		— 17.8		
16	HClO ₄ .3H ₂ O.....	154.512		— 43.2 (α) — 37 (β)		
17	HBr.....	80.9237		— 86	l. 2.16 ⁻⁸⁸	5
18	HBr.2H ₂ O.....	116.955		— 11	2.11 ⁻¹⁶	
19	HBr.3H ₂ O.....	134.970		— 47.5		
20	HBr.4H ₂ O.....	152.985		— 55.8		
21	HBrO.....	96.9237				
22	HBrO ₂	128.924		d. 100		
23	BrF ₃	136.916		5		
24	IO ₂	158.932		d. 130	4.2 ₁₀ ¹⁰	
25	I ₂ O ₅	333.864		d. 300	4.799 ₄ ²⁸	
26	HI.....	127.940		— 50.8	l. 2.847 ^{-4.7}	27
27	HI.2H ₂ O.....	145.955		— 43		
28	HI.3H ₂ O.....	163.970		— 48		
29	HI.4H ₂ O.....	181.985		— 36.5		
30	HIO ₃	175.940	R.	110	4.629°	
31	HIO ₄	191.940				
32	HIO ₄ .2H ₂ O.....	227.971	M. ?	d. 110		
33	I ₂ O ₅ .HIO ₃	509.804		Tr. 170		
34	IF ₃	221.932		8	l. 3.5	
35	ICl (α).....	162.390		27.2	l. 3.24 ₄ ²⁴ 3.182°	
35.1	ICl (β).....	162.390	R.	13.9	l. 3.24 ₄ ²⁴ l. 3.182°	
36	ICl ₃	233.306	R.	ca. 33	3.11 ¹⁶	
37	IBr.....	206.848		ca. 42	4.414 ¹⁰	

Ag 32 Al 55 As 13 Au 38 B 54 Ba 79 Be 15 Bi 5 Br 5 C 16 Ca 77 Cb 51 Cd 29 Ce 59 Cl 44 Co 46 Cr 35 Cu 31 Dy 67 Er 69 Eu 64 F 9 Fe 43 Ga 25 Gd 65 Ge 20 Gl 75 H 2 HF 73 Hg 30 Ho 68 I 6 In 26 Ir 36 K 38 La 58 Li 31 Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
38	SO ₂	64.0650		- 72.7		15
39	SO ₃	80.0650		16.83	1. 1.923	
40	S ₂ O ₇	176.130		0		
41	H ₂ S.....	34.0804		- 82.9	1. 0.96 ⁶⁰	10
42	H ₂ S ₂	66.1454		- 88	1. 1.376	65
43	H ₂ S ₃	98.2104		- 53	1. 1.496 ¹⁸	
44	H ₂ S ₄	162.340			1. 1.71 ¹⁵	
45	H ₂ SO ₄	98.0804		10.49	1. 1.834	18
46	H ₂ SO ₄ ·H ₂ O.....	116.095		8.62	1. 1.842 ¹⁵	
47	H ₂ SO ₄ ·2H ₂ O.....	134.019		- 38.9	1. 1.650 ⁹	
48	H ₂ SO ₄ ·4H ₂ O.....	170.142		- 25		
49	H ₂ SO ₅	114.080		45		
50	H ₂ S ₂ O ₇	178.145		35	1. 1.9 ²⁰	
51	H ₂ S ₂ O ₈	194.145		<60		
52	SF ₆	146.065		- 55		
53	SOF ₂	86.0650		-110		
54	SO ₂ F ₂	102.065		-120 ^{66mm}		
55	SCl ₂	102.981		- 78	1. 1.621 ¹⁵	56
56	SCl ₄	173.897		- 30		
57	S ₂ Cl ₂	135.046		- 80	1. 1.678	61
58	SOCl ₂	118.981			1. 1.638	52
59	SO ₂ Cl ₂	134.981		- 54.1	1. 1.667	22
60	SO ₃ ·SO ₂ Cl ₂	215.046		- 37.5	1. 1.837	
61	S ₂ O ₃ Cl ₂	253.962	R.	57 d.		
62	SO ₂ OHCl.....	116.531		- 80	1. 1.753	20
63	S ₂ Br ₂	223.962		- 46	1. 2.635	64
64	SOBr ₂	207.897		- 50	1. 2.68 ¹⁸	
65	SOClBr.....	163.439			1. 2.31 ⁰	
66	SeO ₂	111.200		340	3.953 ¹⁵	
67	HSe.....	80.2077				
68	H ₂ Se.....	81.2154		- 64	1. 2.12 ⁻⁴²	
69	H ₂ SeO ₃	129.215	H.	d.	3.004 ¹⁵	
70	H ₂ SeO ₄	145.215	H.	58	2.950 ¹⁵	
71	H ₂ SeO ₄ ·H ₂ O.....	161.230		25	1. 2.608 ¹⁵	
72	SeF ₄	155.200		- 80	2.627 ¹⁵	
73	SeF ₆	193.200			1. 2.356 ¹⁵	
74	SeCl ₄	221.032				
75	Se ₂ Cl ₂	229.316			1. 2.906 ^{17.5}	
76	SeOCl ₂	166.116		8.5	1. 2.44	
77	Se ₂ Br ₂	318.232			1. 3.604 ¹⁵	
78	SeOBr ₂	255.032		41.7	1. 3.38 ²⁰	
79	H ₂ SeO ₄ ·SO ₃	225.280		6.6		
80	H ₂ SeO ₄ ·2SO ₃	305.345		20		
81	SO ₃ ·SeCl ₄	301.097		165		
82	TeO ₂ —Tellurite.....	159.500	Tet. P.		Tet. 5.66 ⁰	1056
83	TeO ₃	175.500		d.	R. 5.89 ⁰	
84	H ₂ Te.....	129.515		- 48	5.08 ^{10.5}	
85	H ₂ TeO ₄	193.515		d. 160	1. 2.57 ⁻²⁰	
86	Te(OH) ₆ (α).....	229.546	C.		3.44 ^{19.2}	
86.1	Te(OH) ₆ (β).....	229.546	M.		3.053	
87	TeF ₆	241.500			3.071	
88	TeCl ₂	198.416		175		
89	TeCl ₄	269.332		214		
90	TeCl ₄ ·HCl·5H ₂ O.....	395.875		- 20		
91	TeBr ₂	287.332		ca. 280		
92	TeBr ₄	447.164		ca. 380	4.31 ¹⁵	
93	TeI ₄	635.228		259	8.403 ¹⁵	
94	2TeO ₃ ·SO ₃	399.065	R.	d. 500	4.7	
95	NO.....	30.0080		-161	1. 1.269 ^{-160.2}	7
96	NO ₂	46.0080		- 9.3	1. 1.448	

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
78	42	42	11	23	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
97	N ₂ O.....	44.0160	R.	-102.4	1. 1.226 ⁻⁸⁹	2
98	N ₂ O ₃	76.0160		-102	1. 1.447 ²	
99	N ₂ O ₄	108.016		30		
100	2N ₂ O ₄ .H ₂ O.....	234.047		5	1. 1.682 ¹⁸	
101	N ₄ O ₆	152.032				
102	NH ₃	17.0311		-77.7	0.817 ⁻⁷⁹	
					1. 0.607	
103	H ₂ N.NH ₂	32.0468		1.4	1. 1.011 ¹⁵	
104	N ₂ H ₄ .H ₂ O.....	50.0622		< -40	1. 1.03 ²¹	
105	N ₂ H ₄	43.0317		-80		
106	NH ₃ .HN ₃	60.0628		110		
107	2NH ₃ .H ₂ O.....	52.0776	R.	-78		12
108	N ₂ H ₄ .HN ₃	75.0785		65		
109	HNO ₃	63.0157		-42	1. 1.502	
110	HNO ₃ .H ₂ O.....	81.0311		-38		
110.1	HNO ₃ .3H ₂ O.....	117.0619		-18.5		
111	NH ₂ OH.....	33.0311		34	1.35	
					1. 1.204 ^{23.5}	
112	H ₂ NO ₄	81.0311		-34		
113	NH ₂ OH.....	35.0465		-77		
114	H ₂ NO ₄	99.0465		-35		
115	(OH) ₄ NON(OH) ₄	180.078		-39		
116	NH ₂ NO ₂	62.0314	R.	72 d.		21
117	NH ₄ NO ₂	64.0468		d.		
118	NH ₄ NO ₂	80.0468		169.6	α 1.66 ²⁵ β 1.725 ²⁵	
119	NH ₄ ONNOH.....	79.0625		65		
120	N ₂ H ₄ .HNO ₃	95.0625		70.7		
				62.1		
121	NH ₄ NO ₂ .HNO ₃	143.063		12		
122	N ₂ H ₄ .2HNO ₃	158.078		104		
123	NH ₄ NO ₂ .2HNO ₃	206.078		30		
124	NH ₄ NO ₂ .3NH ₃	131.140		ca. -40		
125	NOF.....	49.0080	R.	-134		145
126	NO ₂ F.....	65.0080		-139		
127	NH ₄ F.HF.....	57.0465			1. 1.211 ¹¹	
128	N ₂ H ₄ (HF) ₂	72.0622		105		
129	NCl ₃	120.382			1. 1.653	
130	NOCl.....	65.4660		-64.5	1. 1.417 ⁻¹²	
131	NO ₂ Cl.....	81.4660		< -30	1. 1.32 ¹⁴	
132	NH ₄ Cl—Salammoniac.....	53.4968			1.536	
133	N ₂ H ₄ .HCl.....	68.5125		89		
134	N ₂ H ₄ .2HCl.....	104.978		198	1.42	
135	NH ₄ Cl.3NH ₃	104.590	M.	10.7		489
136	NH ₄ Cl.6NH ₃	155.683		-18		
137	NH ₂ OH.HCl.....	69.4968		151	1.67 ¹⁷	
138	NH ₄ ClO ₄	117.497		d.	1.95	
139	N ₂ H ₄ .HClO ₄	116.513		exp. 80		
140	N ₂ H ₄ .HClO ₄ .2H ₂ O.....	168.543		132		
141	NOBr.....	109.924		-55.5		
142	NOBr ₃	269.756		-40	1. 2.637	
143	NH ₄ Br.....	97.9548			2.548	
144	N ₂ H ₄ .HBr.....	112.971		80		
145	HBr.2NH ₃	114.986	R.			153
146	NH ₄ Br.3NH ₃	149.048		13.7		
147	NH ₄ Br.6NH ₃	200.141		-20		
148	NH ₄ I.....	144.971			2.563	
149	NH ₃ I ₂	270.895		-2	1. 2.46 ¹⁶	
150	NH ₄ I ₃	398.835			3.749	
151	NH ₄ I.NH ₃	162.002				
152	N ₂ H ₄ .HI.....	159.987		exp. 127		
153	N ₂ H ₄ .2HI.....	287.926		220		
154	NI ₂ .NH ₃	411.835		d. > 20	3.5	

Ag Al As Au B Ba Be Bi Br C Ca Ch Cd Cs Cl Co Cr Cu Dy Er Eu F Fe Ga Gd Ge Gl H Hf Hg Ho I J K La
32 55 13 33 54 79 75 15 5 16 77 51 29 59 4 44 40 85 31 67 69 64 3 43 25 65 20 75 2 73 30 68 6 36 36 55 58 59 70

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
155	NH ₄ I.3NH ₃	196.064		— 8		
156	NH ₄ I.4NH ₃	213.095		— 5.1		
157	3N ₂ H ₄ .2HI.....	352.020		90		
158	NH ₄ I.6NH ₃	247.157		28		
159	NH ₄ IO ₃	192.971	R.	d. 150	3.309 ²¹ ₄	
160	NH ₄ IO ₄	208.971	Tet.	exp.	3.056 ¹⁸ ₄	
161	2NH ₄ IO ₃ .H ₂ O.....	403.957	Tri.	exp. 150		
162	3NH ₃ .OH.HI.....	227.033		104		
163	N ₂ S ₈	188.341		11	1.1901 ¹⁸ ₄	
164	N ₂ S ₄	184.292	R.	178	2.22 ¹⁸ ₄	
165	N ₂ O ₃ .2SO ₃	236.146		230	2.14	
166	NH ₄ SH.....	51.1115				
167	(NH ₄) ₂ S.....	68.1426		d.		
168	NO ₂ SO ₃ H.....	127.081	R.	73 d.		
169	NH ₂ SO ₃ H.....	97.0961	R.	205 d.	2.03 ¹⁸ ₄	
170	NH ₄ HSO ₄	115.112		146.9	1.78	
171	SO ₂ (NH ₄) ₂	96.112	R.	92		
172	NH ₂ SO ₃ NH ₄	114.127		125		
173	N ₂ H ₄ .H ₂ SO ₄	130.127	R.	254	1.37	
174	(NH ₄) ₂ SO ₄ —Muscagnite.....	132.143	R.	513 d.	1.769	602
175	(NH ₂ OH) ₂ .H ₂ SO ₄	164.143	M.	170		
176	(NH ₄) ₂ S ₂ O ₃	148.208	M.	d. 150		
177	(NH ₄) ₂ S ₂ O ₄	180.208	R.	d.		
178	(NH ₄) ₂ S ₂ O ₆	196.208	M.	d. 130		
179	(NH ₄) ₂ S ₂ O ₈	228.208	M.	d. 120	1.982	543
181	NH(SO ₂ NH ₄) ₂	179.223				
182	NH(SO ₂ NH ₄) ₂	211.223	M.	357	1.965	
183	(N ₂ H ₄) ₂ .H ₂ SO ₄	162.174		117		
184	NH ₄ SO ₃ F.....	117.104		245		
185	NSe.....	93.2080		exp. 200		
186	SeO ₂ (NO ₂) ₂	203.216		— 13		
187	NH ₄ HSeO ₄	162.247	R.	d.	2.162	
188	(NH ₄) ₂ SeO ₄	179.278	M.	d.	2.194	686
189	(NH ₄) ₂ SeBr ₆	594.774	C.		3.326	
190	(NH ₄) ₂ TeO ₄	227.578			3.01 ²⁵ ₄	
191	P ₂ O ₃	110.048	M.	22.5	2.135 ²¹ ₄	
192	P ₂ O ₄	126.048	R.?	> 100	2.537 ^{22, 6} ₄	
193	P ₂ O ₅	142.048		563 var.	2.387	
194	P ₄ O.....	140.096			1.912 ²⁶ ₄	
195	PH ₃	34.0471		—132.5	1.0746 ^{—90}	4
196	P ₂ H ₄	63.0557			1.83 ¹⁹ ₄	
197	P ₂ H ₆	66.0788			1.1012	
198	P ₂ H ₈	281.231			1.95 ¹⁸ ₄	
199	P ₁₂ H ₈	378.334			1.83 ¹⁹ ₄	
200	H ₂ PO ₃	81.0394		35		
201	H ₂ PO ₂	66.0471			1.493 ^{18, 3} ₄	
202	H ₂ PO ₃	82.0471		73.6	1.651 ^{21, 2} ₄	
203	H ₂ PO ₄	98.0471		42.3 ₅	1.834 ^{18, 2} ₄	
204	PF ₃	88.0240		—160		
205	PF ₅	126.024		— 83		
206	POF ₃	104.024		— 68		
207	PCl ₃	137.398		—111.8	1.1574 ^{20, 8} ₄	47
208	PCl ₅	208.314	Tet.	148 P.		
209	P ₂ Cl ₄	203.880		— 28		
210	POCl ₃	153.398		1.25	1.1675	25
211	P ₂ O ₃ Cl ₄	251.880		< — 50	1.158 ⁷	
212	PH ₄ Cl.....	70.5128		28 ⁴⁶ atm.		
213	PF ₃ Cl ₂	158.940				
214	PBr ₃	270.772		— 40	1.2852 ¹⁸ ₄	62
215	PBr ₅	430.604	R.			
216	POBr ₃	286.772		56	2.822	
217	PH ₄ Br.....	114.971				
218	POCl ₂ Br.....	197.856		13	1.2.104	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Sn So Si Sm Sr Tb Th Ti Tl Tm U V W Y Yb Zn Zr
 78 48 47 11 32 61 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 43 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
219	POClBr ₂	242.314		30	1.2.45 ⁴⁰	
220	PI ₃	411.820	H.	61		
221	P ₂ I ₄	569.776	Tri.	110		
222	PH ₄ I.....	161.987				
223	P ₂ S ₃	158.243		290		
224	P ₂ S ₆	222.373		276	2.03	
225	P ₂ S ₈	285.462		298		
226	P ₂ S ₁₀	220.291		172.5	2.03 ¹⁷	
227	P ₂ S ₁₂	348.551		310	2.19 ¹⁷	
228	P ₂ S ₁₆	444.746		290		
229	P ₂ O ₃ S ₃	190.243		300		
230	P ₂ O ₃ S ₄	348.356		102		
231	PSF ₃	120.089		3.87 ^{sat.}		
232	PSCl ₃	169.463		- 35	1.1.635	193
233	PS ₂ Cl ₃	272.444		< - 17		
234	PSBr ₃	302.837		38	2.85 ¹⁷	
235	P ₂ SBr ₆	573.609		- 5		
236	P ₂ S ₂ Br ₄	477.907			1.2.262 ¹⁷	
237	PSCl ₂ Br.....	213.921		- 30	1.2.12 ⁹	
238	PSClBr ₂	258.379		- 60	1.2.48 ⁹	
239	P ₂ Si ₂	347.977		75		
240	P ₂ N ₄	163.112			2.51 ¹⁸	
241	NH ₄ H ₂ PO ₃	83.0782		100		
242	NH ₄ H ₂ PO ₃	99.0782		ca. 123		
243	NH ₄ H ₂ PO ₄	115.078	Tet.		1.803	250
244	N ₂ H ₄ H ₂ PO ₃	114.094		36		
245	N ₂ H ₄ H ₂ PO ₄	130.094		82		
246	(NH ₄) ₂ HPO ₄	118.091			1.619	
247	(N ₂ H ₄) ₂ H ₂ P ₂ O ₆	194.126		152		
248	(NH ₄) ₂ H ₂ P ₂ O ₆	196.141		170		
249	N ₂ H ₄ (H ₂ PO ₃) ₂	196.141		82		
250	P ₂ N ₂ Cl ₆	347.844	R.	114	1.98	
251	P ₂ N ₄ Cl ₈	463.792		123.5	2.18 ²⁴	
252	P ₂ N ₆ Cl ₁₀	579.740		41		
253	P ₂ N ₆ Cl ₁₂	695.688		91		
254	P ₂ N ₇ Cl ₉	603.322		237.5		
255	P ₂ N ₇ Cl ₁₄	811.636		< - 18		
256	PNBr ₂	204.864	R.	190		
257	PS ₂ NH ₄	145.258			1.1.78 ^{10,6}	
258	As ₂ O ₃	197.920		275	3.71	
259	As ₂ O ₃ —Arsenite.....	197.920	C.		3.865 ²⁶	
260	As ₂ O ₃ —Arsenolite.....	197.920	C.		3.86	160
261	As ₂ O ₃ —Claudetite.....	197.920	M.	316	4.15	986
262	As ₂ O ₅	229.920			4.086	
263	AsH ₃	77.9831		-113.5		
264	AsF ₃	131.960			1.2.666 ⁹	
265	AsF ₅	169.960		- 80		
266	AsCl ₃	181.334		- 18	1.2.163	191
267	AsCl ₅	252.250		ca. - 40		
268	AsBr ₃	314.708		32.8	1.3.540 ²⁸	
269	AsI ₃	455.756		146	4.39 ¹⁸	
270	AsI ₅	709.620		76	3.93	
271	As ₂ S ₃ —Realgar.....	214.050	M.	307 (β)	α 3.506 ¹⁹	1067
				Tr. 267	β 3.254 ¹⁹	
272	As ₂ S ₃ —Orpiment.....	246.115	M.	300	3.43	1071
				Tr. 170		
273	As ₂ S ₅	396.035			3.60 ¹⁹	
274	2AsSCLAs ₂ S ₃	531.081		120		
275	2AsI ₃ Si ₆	1705.17		72		
276	NH ₄ H ₂ AsO ₄	159.014	Tet.		2.311 ^{9,1}	283
277	(NH ₄) ₂ HAsO ₄	176.045	M.		1.989	
278	SbO ₂ —Cervantite.....	153.770	C.		4.07	174
279	Sb ₂ O ₃ —Valentinite.....	291.540	R.	656	5.67	1024

Ag 32
Al 55
As 13
Au 83B 54
Ba 79
Be 15
Bi 75
Br 5C 16
Ca 77
Cd 51
Ce 59Cl 4
Co 44
Cr 46
Cu 85
31Dy 67
Er 69
Eu 64
F 3
Fe 43Ga 25
Gd 65
Ge 20
Gl 75
H 2Hf 73
Hg 80
Ho 68
I 6
In 26Ir 36
K 83
La 58
Li 81
Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
280	Sb ₂ O ₃ —Senarmonite.....	291.540	C.		5.2	178
281	Sb ₂ O ₃	323.540			3.78	
282	SbH ₃	124.793		— 88	l. 2.26 ²⁵	
283	SbF ₃	178.770	R. ?	292	4.379 ^{20,9}	
284	SbF ₃	216.770		7	l. 2.990 ^{22,5}	
285	SbF ₃ ·2SbF ₃	574.310		390	4.188 ²¹	
286	SbCl ₃	228.144		73.4	3.140 ²⁴	
287	SbCl ₃	299.060		2.8	l. 2.336	58
288	SbOCl.....	173.228		170 d.		
289	Sb ₂ O ₃ Cl ₃	637.996	M.		5.014	
290	SbF ₂ Cl ₃	266.144		55		
291	SbBr ₃	361.518		96.6	4.148 ²³	
					l. 3.845 ^{20,5}	
292	SbI ₃	502.566	Trig. M. R.	167	M. 4.768 ²²	
				Tr. 114	Trig. 4.848 ²⁶	
				(R. to Trig.)		
				Tr. 125		
				(M. to Trig.)		
293	SbI ₃	756.430		79		
294	SbF ₃ I.....	343.702		ca. 80		
295	(SbF ₃) ₂ I.....	560.472		ca. 115		
296	Sb ₂ S ₃ —Stibnite.....	339.735	R.	550	4.64	1032
					red 4.120 ⁰	
					gray 4.284 ⁰	
					black 4.652 ⁰	
					3.625 ⁴	
297	Sb ₂ (SO ₄) ₃	531.735			4.6	1073
298	Sb ₂ O ₃ ·2Sb ₂ S ₃ —Kermesite.....	971.010	M.			
299	SbF ₃ S.....	248.835		230		
300	SbSe.....	200.970		542		
301	Sb ₂ Se ₃	481.140		611		
302	SbS ₂ Se.....	682.110		605		
303	Sb ₂ Se ₃	883.080		590		
304	Sb ₂ Te ₃	626.040		629		
305	BiO.....	225.000			7.5	
306	BiO ₂	241.000			5.6	
306.1	BiO ₂ ·2H ₂ O.....	277.031		d. 110	5.6	
307	Bi ₂ O ₃ (I).....	466.000	R.	820	8.9	
308	Bi ₂ O ₃ (II).....	466.000		Tr. 704	8.20	
309	Bi ₂ O ₃ (III).....	466.000	R.	860	8.5	
310	Bi ₂ O ₃ ·3H ₂ O—Bismite.....	520.046	R.	d. 415	4.36	393
311	Bi ₂ O ₃	498.000			5.10	
312	HBiO ₃	258.008		d. 120	5.75	
313	BiF ₃	266.000			5.32	
314	BiOF.....	244.000			7.5	
315	BiCl.....	244.458		320		
316	BiCl ₃	315.374		230	4.7	
317	BiCl ₄	350.832		225		
318	BiOCl.....	260.458			7.72	
319	BiBr.....	288.916		287		
320	BiBr ₃	448.748		218	5.7	
321	BiOBr.....	304.916			8.08	
322	BiI.....	589.796	H.	439	5.7	
323	BiOI.....	351.932	R.		7.92	
324	BiS.....	241.065		685	7.7	
325	Bi ₂ S ₃ —Bismuthinite.....	514.195	R.		7.39	
326	BiSe.....	288.200		625		
327	Bi ₂ Se ₃ —Guanajuatite.....	655.600	R.	710	6.82	
328	Bi ₂ Te ₃	800.500		573	7.7	
329	Bi ₂ TeO ₆ ·2H ₂ O—Montanite.....	677.531			3.79	1002
330	Bi ₂ Te ₂ S—Tetradymite.....	705.065	R.		7.5	
331	Bi(NO ₃) ₃ ·5H ₂ O.....	485.101	Tri.	d. 30	2.83	
332	Bi(NO ₃) ₃ ·6H ₂ O.....	503.116			2.76	
333	BiPO ₄	304.024	M.		3.23	

Mg Mn Ni Cu P Pb Pd Pr Pt Rb Rh Ru S Se Sb Sn Si Sm Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 78 82 87 11 23 31 41 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 66 9 18 22 78 82 66 10 24 19 27 70 49 60 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
334	BiAsO ₄	347.960	M.		7.14	
335	Bi ₂ AsH ₂ O ₄ —Atelestite.....	831.975	M.		6.4	1009
336	5Bi ₂ O ₃ ·2As ₂ O ₃ ·9H ₂ O?—Rhagite.....	2887.98			6.82	
337	CO.....	28.0000		−207	1.0.8138 ¹⁹⁵	
338	CO ₂	44.0000		−56.6 ^{5.2at.}	1.53 ⁷⁹	
					1.1.101 ⁸⁷	
339	C ₂ O ₂	68.0000		−107	1.114 ⁰	23

Compounds of C with elements of key numbers 2 to 15 in C-Table, p. 176

340	SiO ₂ —Cristobalite.....	60.0600	C. Tet. ?	1710	2.32	228
341	SiO ₂ —Lechatelierite.....	60.0600			2.20	24
342	SiO ₂ —Quartz.....	60.0600	Trig.	<1470 m.	2.651	267
343	SiO ₂ —Tridymite.....	60.0600	R.	1670	2.26	463
344	SiO ₂ ·H ₂ O—Opal.....	60.0600			2.1 to 2.3	69, 82
345	SiH ₄	32.0908		−185	1.0.68 ¹⁸⁸	
346	Si ₂ H ₆	62.1662		−132.5	1.0.69 ²⁸	
347	Si ₃ H ₈	92.2416		−117	1.0.725 ⁰	
348	Si ₄ H ₁₀	122.317		−93.5	1.0.79 ⁰	
349	Si ₂ H ₆ O.....	78.1662		−144	1.0.881 ⁸⁰	
350	SiF ₄	104.060		−77		
351	SiHF ₃	86.0677		ca. −110		
352	SiCl ₄	169.892		−70	1.1.483	192
353	Si ₂ Cl ₆	268.868		−1	1.1.58 ⁰	
354	Si ₃ Cl ₈	367.844		−67		
357	Si ₄ Cl ₁₀	466.820				
358	Si ₅ Cl ₁₂	565.796				
359	Si ₆ Cl ₁₄	664.772		170 s. d.		
360	Si ₂ OCl ₄	284.868		−33		
361	Si ₄ O ₄ Cl ₈	459.904				
362	Si ₄ O ₃ Cl ₁₀	514.820				
363	Si ₃ O ₁₀ Cl ₁₂	809.976				
364	SiH ₃ Cl.....	66.5411		−118	1.1.145 ¹¹³	
365	SiH ₂ Cl ₂	100.991		−122	1.1.42 ¹²²	
366	SiHCl ₃	135.442		−134	1.1.34	
367	SiBr ₄	347.724		5	2.812 ⁰	190
368	Si ₂ Br ₆	535.616		95		
369	Si ₃ Br ₈	723.508		133		
370	Si ₄ Br ₁₀	911.400		185 d.		
371	SiH ₃ Br.....	110.999		−94	1.1.533 ⁰	
372	SiH ₂ Br ₂	189.907		−77	1.2.17 ⁰	
373	SiHBr ₃	268.816		<−60	1.2.717	
374	Si ₂ H ₅ Br.....	141.075		−100		
375	Si ₂ HBr ₅	456.708		89		
376	SiCl ₃ Br.....	214.350		<−60		
377	SiCl ₂ Br ₂	258.808		<−60		
378	SiClBr ₃	303.266		−39	1.2.432	
379	SiI ₄	535.788		120.5		
380	Si ₂ I ₆	817.712		250		
381	SiHI ₃	409.864		8	1.3.314	
382	SiCl ₃ I.....	261.366		<−60		
383	SiCl ₂ I ₂	352.840		<−60		
384	SiClI ₃	444.314		2		
385	SiBr ₃ I.....	394.740		14		
386	SiBr ₂ I ₂	441.756		38		
387	SiBrI ₃	488.772		ca. 53		
388	SiS.....	60.1250			1.853 ¹⁵	
389	SiSCl ₂	131.041		75		
390	SiCl ₃ SH.....	167.507				
391	SiSBr ₂	219.957		93		
392	SiN.....	42.0680			3.17	
393	Si ₂ N ₂	98.1440			3.64	
394	Si ₃ N ₄	140.212			3.44	
395	Si ₂ N ₂ H ₄	99.1517			2.015 ¹⁷	

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Co	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hi	Hg	Ho	I	Ir	La	Li	Lu	Mn	Mo	Nb	Ni	P	Pb	Pr	Rb	S	Sb	Se	Si	Sn	Te	Ti	Tl	Ta	Tb	Tm	U	V	Zn	Zr
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	63	6	36	57	58	51	71	35	53	28	52	14	61	74	41	72	45	68	47	80	48	81	73						

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
396	Si ₃ H ₈ N.....	107.257			1.0895 ⁻¹⁰⁶	
397	N ₂ H ₄ .H ₂ SiF ₆	176.122		186 d.		
398	(NH ₄) ₂ SiF ₆ —Cryptohalite.....	178.138	C.		2.01	68
399	SiBr ₄ .6NH ₃	449.911			2.307 ¹⁷	
400	SiO ₂ .P ₂ O ₅	202.108			3.1	
401	3SiO ₂ .2Bi ₂ O ₃ —Agricolite.....	1112.18	M.		6	994
402	3SiO ₂ .2Bi ₂ O ₃ —Eulytite.....	1112.18	C.		6.11	175
403	SiC—Carborundum.....	40.0600	H.	> 2700	3.17	410
404	Si(CH ₃)H ₃	46.1062		-156.4	1.062 ₄ ⁻⁸⁷	
405	Si(CH ₃) ₂ H ₂	60.1216		-149.9	1.068 ₄ ⁻⁸⁰	
406	Si(CH ₃) ₄	88.1524			1.0645 ₄ ^{21.9}	
407	Si(CH ₃) ₂ C ₂ H ₅	102.168			1.0684	
408	Si(C ₂ H ₅) ₂ H.....	116.183			1.0751 ⁹	
409	Si(CH ₃) ₂ [(C ₂ H ₅) ₂].....	116.183			1.07168	
410	Si(CH ₃) ₂ C ₂ H ₇	116.183			1.0701 ₄ ²¹	
411	Si(CH ₃) ₂ [(CH ₃) ₄].....	128.183			1.0804	439
412	Si(CH ₃) ₂ (C ₂ H ₅)(C ₂ H ₇).....	130.199			1.0732 ₄ ^{17.6}	
413	Si(CH ₃) ₂ (C ₄ H ₉).....	130.199			1.0721 ₄ ¹⁷	
414	Si(CH ₃) ₂ (<i>iso</i> -C ₄ H ₉).....	130.199			1.0717 ₄ ⁸	
415	Si(CH ₃) ₂ (C ₂ H ₇) ₂	144.214			1.0741 ₄ ^{17.6}	
416	Si(CH ₃) ₂ (C ₂ H ₅)(<i>iso</i> -C ₄ H ₉).....	144.214			1.0743	
417	Si(CH ₃) ₂ (<i>iso</i> -C ₄ H ₁₁).....	144.214			1.0731 ₄ ⁶	
418	Si(C ₂ H ₅) ₄	144.214			1.0766 ₄ ^{19.6}	1036
419	Si(C ₂ H ₇) ₂ H.....	158.229			1.0762 ₄ ⁵	
420	Si(C ₂ H ₅) ₂ (C ₂ H ₇).....	158.229			1.0774 ₄ ⁷	
421	Si(C ₂ H ₅) ₂ (C ₄ H ₉).....	172.245			1.0779 ₄ ¹⁸	
422	Si(C ₂ H ₅) ₂ (<i>iso</i> -C ₄ H ₉).....	172.245			1.0781 ₄ ^{18.6}	
423	Si(C ₂ H ₅) ₂ (<i>iso</i> -C ₄ H ₁₁).....	186.260			1.0782 ₄ ⁹	
424	Si(C ₂ H ₅) ₄	336.214		233		
425	Si ₂ (CH ₃) ₆	146.259			1.0725 ₄ ^{22.5}	
426	Si(OCH ₃) ₄	152.152			1.1028 ₄ ²	9
427	Si(C ₂ H ₅) ₂ OH.....	132.183			1.0871 ⁹	
428	Si(C ₂ H ₅) ₂ OC ₂ H ₅	160.214			1.0840 ⁹	
429	Si(OC ₂ H ₅) ₄	264.276			1.0915	1034
430	Si(C ₂ H ₅) ₂ OH.....	276.183			1.178	
431	Si(C ₂ H ₅ CH ₂) ₂ OH.....	318.229		106	1.177	
432	Si ₂ O(OC ₂ H ₅) ₆	426.443			1.0977 ₄ ^{22.6}	1035
433	Si(CH ₃)H ₂ Cl.....	80.5565		-134.1	1.0935 ₄ ⁻⁸⁰	
434	Si(CH ₃)HCl ₂	115.007		-93	1.093 ₄ ⁹	
435	Si(C ₂ H ₅)Cl ₂	163.473			1.1239 ₄ ^{20.4}	
436	Si(C ₂ H ₇)Cl ₂	177.488			1.1210 ₄ ¹⁰	1
437	Si(C ₂ H ₅) ₂ Cl ₂	157.053			1.1106 ₄ ¹⁸	
438	Si(C ₄ H ₉)Cl ₂	191.503			1.1162 ₄ ^{18.8}	
439	Si(<i>iso</i> -C ₄ H ₉)Cl ₂	191.503			1.1154	
440	Si(C ₂ H ₅)(C ₄ H ₉)Cl ₂	185.084			1.1042	
441	Si(C ₄ H ₉)Cl ₂	211.473			1.1326 ₄ ^{18.8}	
442	Si(C ₂ H ₅ CH ₂)Cl ₂	225.488			1.1289 ₄ ^{19.3}	
443	Si(C ₂ H ₅)(C ₄ H ₉)Cl ₂	205.053			1.1159 ₄ ¹⁸	
444	Si(SCN) ₄	260.352		143.8		
445	TiO ₂ —Anatase.....	79.9000	Tet.		3.84	407
446	TiO ₂ —Brookite.....	79.9000	R.		4.17	1028
447	TiO ₂ —Rutile.....	79.9000	Tet.	1640 d.	4.26	409
448	Ti ₂ O ₃	143.800	Trig.		4.6	
449	TiF ₄	123.900			2.798 ^{20.5}	
450	TiCl ₄	189.732		-30	1.1726	59
451	TiBr ₄	367.564		39		
452	TiBrCl ₃	234.190				
453	TiI ₂	301.764			4.30	
454	TiI ₄	555.628		150		
455	TiCl ₄ .SCl ₄	363.629		64		
456	Ti ₂ N ₂	123.816		2930	5.18 ¹⁸	
457	TiP.....	78.9240			3.95 ₄ ²⁸	
458	TiCl ₄ .PCl ₅	327.130		85.5		

79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
 Nb Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rn Rb Rh Ru S Sb Se Si Sn Sr Tb Tc Te Th Ti Tl Tm U V W Y Yb Zn Zr
 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
459	TiCl ₄ .POCl ₃	343.130	R.	110		
460	TiCl ₄ .2POCl ₃	496.528		107		
461	TiC.....	59.9000		3180	4.25	
462	Ti ₁₀ C ₂ N ₈	615.064			5.29	
463	Ti ₃ Si.....	123.860			4.02	
464	GeO ₂	104.380			4.703	
465	GeH ₄	76.4108		-165	1.1.523 ⁻¹⁴³	
466	Ge ₃ H ₈	150.806		-109	1.1.98 ⁻¹⁰⁹	
467	Ge ₃ H ₈	225.202		-105.6	1.2.20 ⁻¹⁰⁶	
468	GeCl ₄	214.212		-49.5	1.1.874 ²⁵	
469	GeHCl ₃	179.762				
470	GeBr ₄	392.044		26.1	1.3.132 ²⁸	
471	GeI ₄	580.108		144	4.322 ²⁸	
472	Ge(C ₂ H ₅) ₄	188.534		-90	0.991 ^{24,5}	13

All Zr salts probably contaminated with 1-5% Hf

473	ZrO ₂ —Baddeleyite.....	123.000	M.	2700	5.49	1012
473.1	ZrO ₂ (free from Hf).....	123.000			5.73	
474	ZrF ₄	167.000			4.48	
475	ZrCl ₄	232.832				
475.5	ZrOCl ₂ .8H ₂ O.....	322.039				274.5
476	ZrOS.....	139.065			4.87	
477	4ZrO ₂ .3SO ₃	732.195			4.1	
478	4ZrO ₂ .3SO ₃ .15H ₂ O.....	1002.43	M.		2.5	
478.5	(NH ₄) ₂ ZrF ₇	278.034	C.			70.2
479	ZrP ₂	153.048			4.77 ²⁵	
480	2ZrCl ₄ .PCl ₅	673.978		164.5		
481	ZrC ₂	115.000				
482	ZrSi ₃	147.120			4.88 ²²	
483	ZrO ₂ .SiO ₂ —Zircon.....	183.060	Tet.	2500	4.5	382, 387
484	SnO.....	134.700	C.		6.95	
485	SnO ₂ —Cassiterite.....	150.700	Tet. H. R.		7.0	391
486	SnF ₄	194.700			4.78	
487	SnCl ₂	189.616		246.8		
488	SnCl ₄	260.532		-30.2	1.2.226	
489	H ₂ SnCl ₆ .6H ₂ O.....	441.556			1.925 ²⁷	
490	SnBr ₂	278.532		215.5	5.12 ¹⁷	
491	SnBr ₄	438.364		31.0	1.3.34 ²⁵	
492	SnCl ₂ .Br.....	304.990		-31	1.2.5 ¹³	
493	SnCl ₂ .Br ₂	349.448		-20	1.2.8 ¹³	
494	SnClBr ₃	393.906		1	1.3.1 ¹³	
495	SnI ₂	372.564		320		
496	SnI ₄	626.428		143.5	4.46	
497	SnCl ₂ I ₂	443.480			1.3.29	
498	SnBr ₂ I ₂	532.396		50 d.	3.6	
499	SnS.....	150.765		880	5.080 ⁰	
500	SnS ₂	182.830			4.5	
501	SnSe.....	197.900		861	6.18 ⁰	
502	SnSe ₂	277.100			5.0	
503	SnTe.....	246.200		780	6.48	
504	SnCl ₄ .2NOCl.....	391.464		180	2.6	
505	2NH ₄ Cl.SnCl ₄	367.526			2.4	
506	(NH ₄) ₂ SnBr ₆	634.274			3.50	
507	Sn ₄ P ₃	567.872			5.18	
508	SnCl ₄ .POCl ₃	413.930		58		
509	Sn ₂ As ₃	462.280			6.56	
510	SnC ₂ O ₄	206.700			3.56 ¹⁸	
512	Sn(C ₂ H ₅) ₂	176.777			1.1.654	
513	Sn(CH ₃) ₄	178.792			1.1.314 ⁰	50
514	Sn(CH ₃) ₂ (C ₂ H ₅) ₂	206.823			1.1.232	
515	Sn(C ₂ H ₅) ₄	234.854			1.1.187 ²³	44
516	Sn(C ₆ H ₅) ₂	272.777		225.7		

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
32	55	13	33	54	79	75	15	5	10	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	63	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
517	$\text{Sn}(\text{C}_2\text{H}_5)_4$	426.854		226		
518	$\text{Sn}_2(\text{C}_2\text{H}_5)_6$	411.631			1. 1.412°	
519	$\text{Sn}(\text{C}_2\text{H}_5\text{O}_2)_2$	236.746		182		
520	$\text{SnCl}(\text{C}_2\text{H}_5)_3$	241.274			1. 1.428°	
521	$\text{SnBr}(\text{C}_2\text{H}_5)_3$	285.732			1. 1.630	
522	$\text{SnI}(\text{CH}_3)_3$	290.701			1. 2.109 ¹⁸	
523	$\text{SnI}(\text{C}_2\text{H}_5)_3$	332.748			1. 1.833 ²²	
524	PbO—Litharge	223.200	Tet.	888	9.58	423
525	PbO—Massicotite	223.200	R.		8.0	1068
526	PbO ₂ —Plattnerite	239.200	Tet.		9.375	417
527	Pb ₃ O ₄ —Minium	685.600			9.1	
528	PbF ₂	245.200		855	8.24	
529	PbCl ₂ —Cotunnite	278.116	R.	501	5.85	1016
530	PbCl ₄	349.032		— 15	1. 3.18 ₄ ⁹	
531	Pb(ClO ₂) ₂	342.116		exp. 126		
532	Pb(ClO ₂) ₂	374.116			3.89	
533	Pb(ClO ₃) ₂ ·H ₂ O	392.131	M.	d. 110		
534	Pb(ClO ₄) ₂ ·3H ₂ O	460.162	R.	d. 100	2.6	
535	PbO·PbCl ₂ —Matlockite	501.316	Tet.	524 d.	7.21	1008
536	2PbO·PbCl ₂ —Mendipite	724.516	R.	698	7.08	1022
537	PbO·2PbCl ₂ —Penfieldite	779.432	H.			398
538	6PbO·PbCl ₂ —Lorettoite	1617.32	Tet.		7.6	418
539	PbCl ₂ ·PbO·H ₂ O—Laurionite	519.331	R.	d. 142	6.24	1006
540	PbCl ₂ ·PbO·H ₂ O—Paralaurionite	519.331	M.	d. 150	6.05	
541	2PbCl ₂ ·PbO·H ₂ O—Fiedlerite	797.447	M.	d. 150	5.88	1005
542	PbFCl	261.658	Tet.	601		
543	PbBr ₂	367.032	R.	378	6.66	
544	Pb(BrO ₃) ₂ ·H ₂ O	481.047	M.	d. 180	5.58	
545	PbO·PbBr ₂ ·H ₂ O	608.248	R.		6.72	
546	PbClBr	322.574			5.74	
547	PbI	334.132		d. 300		
548	PbI ₂	461.064	H.	402	6.16	
549	Pb(IO ₃) ₂	557.064		d. 300		
550	PbO·PbI ₂	684.264		300 d.		
551	PbI ₂ ·PbO·H ₂ O	702.280	R.	d. <100	6.88	
552	PbS—Galena	239.265	C.	1114	7.5	189
553	PbSO ₄ —Anglesite	303.265	R. M.	1170	6.2	981
				Tr. 864		
554	PbS ₂ O ₃	319.330			5.18	
556	PbS ₂ O ₆ ·4H ₂ O	439.392			3.22	311
557	Pb ₂ O(SO ₄)—Lanarkite	526.465	M.	977	6.92	995
558	PbSe—Clausthalite	286.400	C.	1065	8.10	
559	PbSeO ₄	350.400	R.	d.	6.37	
560	PbTe—Attaite	334.700	C.	917	8.16	
561	PbN ₄	291.248		exp. 350		
562	Pb(NO ₃) ₂	331.216	C. M.	470	4.58	162
563	2PbO·N ₂ O ₅ ·1.5H ₂ O	581.439	M.	d. 100		
564	4PbO·N ₂ O ₅ ·N ₂ O ₄ ·2H ₂ O	1112.86	R.	d. 100		
565	2PbO·N ₂ O ₅ ·H ₂ O	572.431	R.	d. 180	5.98	
566	(NH ₄) ₂ PbCl ₆	456.026	C.	d. 120		
567	Pb(PO ₃) ₂	365.248		800		
568	Pb ₂ P ₂ O ₇	588.448	R.	824	5.8	
569	3PbO·P ₂ O ₅	811.648		1014		389
				Tr. 782		
570	4PbO·P ₂ O ₅	1034.85		982		
571	5PbO·2P ₂ O ₅	1400.10		946		
572	8PbO·P ₂ O ₅	1927.65		860		
573	PbCl ₂ ·3Pb ₂ (PO ₄) ₂ —Pyromorphite	2713.06	H.	1156	6.8	1000
574	Pb(AsO ₂) ₂	421.120			5.85	
575	Pb(AsO ₃) ₂	453.120	H.		6.42	
576	Pb ₂ As ₂ O ₇	676.320		802	6.85	998
577	Pb ₃ (AsO ₄) ₂	899.520		1042	7.80	
578	Pb ₃ (AsO ₄) ₂ ·0.5H ₂ O	908.528			7.00	

Mg Mn Ni N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Se Si Sn Sr Tb Tl Te Th Ti Tl Tm U V W Y Yb Zn Zr
 78 48 47 11 83 51 61 45 1 35 12 23 41 60 37 80 44 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																																	
579	5PbO.Pb ₃ (AsO ₄) ₂	2015.52		862																																			
580	5PbO.Pb ₃ (AsO ₄) ₂ .0.5H ₂ O.....	2024.53	R.		8.04																																		
581	10PbO.3As ₂ O ₅ .3H ₂ O.....	2975.81	H.		6.86	179																																	
582	PbHASO ₄	347.168	M.	d. >200	5.79	1054																																	
583	Pb(H ₂ AsO ₄) ₂	489.151	Tri.	d. 140	4.46	963																																	
584	Pb ₄ (PbOH) ₂ (AsO ₄) ₄	2040.26			7.08																																		
585	2Pb ₃ (AsO ₄) ₂ .2Pb(OH) ₂ .10H ₂ O.....	2461.62			7.1																																		
586	65PbO.21As ₂ O ₅ .12H ₂ O.....	19552.5		d. >200	7.10																																		
587	9PbO.3As ₂ O ₅ .PbCl ₂ —Mimetite.....	2976.68	H.	1140 Tr. 395	7.13	399																																	
588	4PbO.As ₂ O ₃ .2PbCl ₂ —Ecdemite.....	1646.15	R.		7.0																																		
589	3PbCl ₂ .3PbO.As ₂ O ₅ —Georgiadesite.....	1733.87	R.	d.	7.1																																		
590	5PbO.2PbCl ₂ .As ₂ O ₅	1870.15	Tet.		7.14																																		
591	PbS.As ₂ S ₃ —Sartorite.....	485.380	R.	<700 d.	4.6																																		
592	2PbS.As ₂ S ₃ —Dufrenoyite.....	724.645	R.		5.50																																		
593	3PbS.2As ₂ S ₃ —Rathite.....	1210.03	R.		5.41																																		
594	4PbS.As ₂ S ₃ —Jordanite.....	1203.18	M.		6.10																																		
595	4PbS.3As ₂ S ₃ —Baumhauerite.....	1695.41	M.		5.33																																		
596	7PbS.2As ₂ S ₃ —Lengenbachite.....	2167.09	Tri.		5.8																																		
597	10PbS.3As ₂ S ₃ —Guitermanite.....	3131.00			5.94																																		
598	3PbO.Sb ₂ O ₃ —Monimolite.....	1236.68	C.		6.58																																		
599	PbO.PbCl ₂ .Sb ₂ O ₃ —Nadorite.....	792.856	R.		7.02	1059																																	
600	PbS.Sb ₂ S ₃ —Zinkenite.....	579.000	R.		5.3																																		
601	2PbS.Sb ₂ S ₃ —Plumosite.....	818.265	M.		5.62																																		
602	3PbS.Sb ₂ S ₃ —Düfeldtite.....	1057.53			5.9																																		
603	3PbS.2Sb ₂ S ₃ —Domingite.....	1397.27			5.62																																		
604	4PbS.Sb ₂ S ₃ —Meneghinite.....	1296.80	R.		6.30																																		
605	5PbS.Sb ₂ S ₃ —Geocronite.....	1536.06	R.		6.4																																		
606	5PbS.2Sb ₂ S ₃ —Boulangerite.....	1875.80	R.		6.18																																		
607	5PbS.2Sb ₂ S ₃ —Mullanite.....	1875.80	R.		6.3																																		
608	5PbS.4Sb ₂ S ₃ —Plagionite.....	2555.27	M.		5.47																																		
609	6PbS.Sb ₂ S ₃ —Kilbrickenite.....	1775.33			6.5																																		
610	PbS.Bi ₂ S ₃ —Galenobismutite.....	753.460			6.9																																		
611	2PbS.Bi ₂ S ₃ —Cosalite, Bjelkite.....	992.725	R.		6.6																																		
612	2PbS.3Bi ₂ S ₃ —Chiviatite.....	2021.12			6.92																																		
613	3PbS.Bi ₂ S ₃ —Lillianite.....	1231.99	R.		7.0																																		
614	4PbS.5Bi ₂ S ₃ —Rezbanite.....	3528.04			6.2																																		
615	6PbS.Bi ₂ S ₃ —Beegerite.....	1949.79	C.		7.27																																		
616	2BiS ₂ .PbS.Bi ₂ S ₃	1306.51		500 d.	6.42																																		
617	PbCO ₃ —Cerussite.....	267.200	R.	d. 315	6.6	1001																																	
618	PbC ₂ O ₄	295.200			5.28																																		
619	Pb(CH ₃) ₄	267.292		— 27.5	1.1.995	42																																	
621	Pb(CH ₃) ₃ (C ₂ H ₅).....	281.308			1.1.889	43																																	
622	Pb(CH ₃) ₂ (C ₂ H ₅) ₂	295.323			1.1.790	48																																	
623	Pb(CH ₃) ₃ (C ₂ H ₇).....	295.323			1.1.760 ²³	37																																	
624	Pb(C ₂ H ₅) ₃ (CH ₃).....	309.339			1.1.712 ²³	46																																	
625	Pb(CH ₃) ₂ (C ₄ H ₉).....	309.339			1.1.674 ²⁴	34																																	
626	Pb(CH ₃) ₃ (iso-C ₄ H ₉).....	309.339			1.1.668 ^{23,5}	32																																	
627	Pb(CH ₃) ₂ (C ₂ H ₇) ₂	323.354			1.1.623 ^{24,4}	35																																	
628	Pb(C ₂ H ₅) ₄	323.354			1.1.659 ²³	51																																	
629	Pb(CH ₃) ₃ (iso-C ₈ H ₁₇).....	323.354			1.1.524 ^{21,4}	30																																	
630	Pb(C ₂ H ₅) ₃ (C ₂ H ₇).....	337.369			1.1.595 ^{22,5}	49																																	
631	Pb(C ₂ H ₅) ₂ (C ₂ H ₇) ₂	351.385			1.1.529 ^{25,4}	41																																	
632	Pb(CH ₃) ₂ (iso-C ₄ H ₉) ₂	351.385			1.1.504 ^{20,6}	33																																	
633	Pb(C ₂ H ₅) ₃ (iso-C ₄ H ₉).....	351.385			1.1.530 ^{22,6}	40																																	
634	Pb(CH ₃) ₂ (iso-C ₈ H ₁₇) ₂	379.416			1.1.430	31																																	
635	Pb(C ₂ H ₅) ₂ (iso-C ₄ H ₉) ₂	379.416			1.1.456 ²²	36																																	
636	Pb(C ₂ H ₅) ₃ (C ₈ H ₁₇).....	365.400			1.1.482	38																																	
637	Pb(C ₂ H ₅) ₂ (iso-C ₈ H ₁₇).....	365.400			1.1.506 ^{21,8}	39																																	
638	Pb(C ₆ H ₅) ₄	515.354		227.7																																			
639	Pb(CHO) ₂	297.215	R.	d. 190	4.63	973																																	
640	Pb(dl-C ₄ H ₉ O ₈).....	355.231			2.530 ¹⁹																																		
641	Pb(d-C ₄ H ₉ O ₈).....	355.231	R.		3.871 ¹⁹																																		
Ag 23	Al 55	As 13	Au 33	B 54	Be 79	Bi 75	Br 15	C 5	Ca 10	Ce 77	Co 51	Cd 71	Cu 29	Cr 59	Cl 4	Co 44	Cr 46	Cu 85	Cu 31	Dy 67	Er 69	Eu 64	F 3	Fe 43	Ga 25	Gd 65	Ge 20	Gl 75	H 2	Hf 73	Hg 30	Ho 68	I 53	In 62	Ir 36	K 55	La 57	Li 3	Lu 71

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
642	Pb(C ₂ H ₃ O ₂) ₂	325.246		280	3.251	
643	Pb(C ₂ H ₃ O ₂) ₂ .3H ₂ O.....	379.292	M.	75	2.55	710
644	Pb(C ₂ H ₃ O ₂) ₂ .10H ₂ O.....	505.400	R.	22	1.689	
645	Pb(C ₂ H ₃ O ₂) ₄	459.292		180	2.23 ₄ ¹⁸	
646	Pb(C ₂ H ₃ O ₂) ₄	515.354		132		
647	Pb(C ₆ H ₁₁ O ₂) ₂	437.369		74		
648	Pb(C ₇ H ₁₃ O ₂) ₂	465.400		91.5		
649	Pb(C ₈ H ₁₅ O ₂) ₂	493.431		84.5		
650	Pb(C ₉ H ₁₇ O ₂) ₂	521.416		95		
651	Pb(C ₁₀ H ₁₉ O ₂) ₂	549.493		100		
652	Pb(C ₁₂ H ₂₃ O ₂) ₂	605.554		104		
653	Pb(C ₁₄ H ₂₇ O ₂) ₂	661.616		107		
654	Pb(C ₁₆ H ₃₁ O ₂) ₂	717.677		112		
655	Pb(C ₁₈ H ₃₅ O ₂) ₂	769.708		ca. 80		
656	Pb(C ₁₆ H ₃₁ O ₂) ₂	773.739		125		
657	3PbO.2CO ₂ .H ₂ O—Hydrocerusite.....	775.615	H.	d. 400	6.14	395
658	PbCl ₂ .PbCO ₃ —Phosgenite.....	545.316	Tet.		6.13	396
659	PbBr ₂ .PbCO ₃	634.232	Tet.	d.	6.55	
660	Pb(OH) ₂ .PbSO ₄ .2PbCO ₃ —Leadhillite.....	1078.88	M.		6.5	996
661	Pb(OH) ₂ .PbSO ₄ .2PbCO ₃ —Maxite.....	1078.88	R.		6.9	
662	Pb(SCN) ₂	323.346	M.		3.82	
663	PbSiO ₃ —Alamosite.....	283.260	M.	766	6.49	992
664	2PbO.SiO ₂	506.460		746		
665	3PbO.SiO ₂ ?.....	729.660		717		
666	3PbO.2SiO ₂ —Barysilite.....	789.720	Trig.		6.72	394
667	SnPbS ₂ —Teallite.....	390.030	R.		6.4	
668	ThO ₂ —Thorite.....	264.150	C.	>2800	9.69	182
669	ThCl ₄	373.982	R.	820	4.59	
670	ThBr ₄	551.814			5.67	
671	ThS ₂	296.280		d.	6.8	
672	ThOS.....	280.215		d.	6.44	
673	Th(SO ₄) ₂ .9H ₂ O.....	602.419	M.	d.	2.77	
674	Th(PO ₃) ₄	548.246	R.		4.08	
675	ThC ₂	256.150			8.96	
676	ThSi ₂	288.270			7.96 ¹⁶	
677	ThO ₂ .SiO ₂ —Thorite.....	324.210	Tet.		5.3	
678	GaCl ₂	140.636		175		
679	GaCl ₃	176.094		75.5	1.236 ₉₀ ⁸⁰	
680	(NH ₄) ₂ Ga ₂ (SO ₄) ₂ .24H ₂ O.....	992.147			1.77	89
681	In ₂ O ₃	277.600	Trig.		7.17 ₉	
682	InCl ₃	221.174			4.0	
683	In(ClO ₄) ₃ .8H ₂ O.....	557.297		80		
684	InI.....	241.732		351		
685	InI ₂	368.664		212		
686	InI ₃	495.596		199		
687	In ₂ (SO ₄) ₃	517.795			3.438	
688	(NH ₄) ₂ InCl ₆ .H ₂ O.....	346.183	R.		2.281	
689	(NH ₄) ₂ InBr ₆ .H ₂ O.....	568.473	R.		3.167	
690	(NH ₄) ₂ In(SO ₄) ₂ .12H ₂ O.....	541.154			2.011	88
691	Tl ₂ O.....	424.800		300		
692	Tl ₂ O ₃	456.800		759	brown 9.65 ₄ ²¹ black 10.19 ₄ ²²	
693	TiOH.....	221.408				
694	Ti(OH) ₃	255.423		>340		
695	TiF ₃	223.400				
696	TiCl ₃	239.858		430	7.00	
697	TiCl ₃ .4H ₂ O.....	382.836		37		
698	TiClO ₃	287.858			5.047 ₉	
699	TiClO ₄	303.858		501	4.89	
700	TiBr ₃	284.316		460	7.557 ₄ ^{17,3}	
701	TiBr ₃ .4H ₂ O.....	516.210		40		
702	TiBr ₃ .Cl.4H ₂ O.....	471.752		40 d.		
703	TiI ₃	331.332		440	7.09 ₄ ^{14,7}	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sa Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 70 23 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
704	Tl ₂ S	440.865		448	8.0	
705	Tl ₂ S ₂	569.125		128		
706	Tl ₂ S ₃	185.966		127		
707	Tl ₂ SO ₄	504.865	R.	632		975
708	Tl ₂ S ₂ O ₆	568.930	M.		5.57	
709	TlHSO ₄	301.473		120 d.		
710	Tl ₂ Se	488.000		340		
711	Tl ₂ Se.Tl ₂ Se ₃	1134.40		338		
712	Tl ₂ SeO ₄	552.000	R.		6.878	991
713	Tl ₂ Te	536.300		412		
714	Tl ₂ TeO ₄	600.300			5.712	
715	TlN ₃	246.424		334		
716	TlNO ₃	266.408	γ R. β Trig. α C.	206 Tr. 75 (γ to β) Tr. 145 (β to α)	5.556 ^{21.4}	1053
717	(NH ₄) ₂ TlCl ₄ .2H ₂ O	507.295			2.389	
718	Tl ₂ PO ₄	708.224			6.86	
719	Tl ₂ P ₂ O ₇	991.648	M.	>120	6.786	
720	TlH ₂ PO ₄	269.439	M.	190		
721	TlH ₂ PO ₄	301.439	M.	190	4.723	
722	Tl ₂ H ₂ P ₂ O ₇	584.863		270		
723	Tl ₂ S.As ₂ S ₃ —Lorandite	686.980	M.		5.53	1072
724	TlSbAs ₂ S ₃ —Vrbaite	636.415	R.		5.30	
725	Tl ₂ CO ₃	468.800			7.11	
726	Tl(C ₂ H ₃ O ₂)	263.423		110	3.68 1.3.9	
727	Tl(CHO ₂) ₃	339.423	M.	95		
728	Tl(C ₂ H ₃ O ₂)	277.439		140	2.8	
729	Tl(d-C ₄ H ₉ O ₆)	353.439	R.		3.496	
730	Tl(dl-C ₄ H ₉ O ₆)	353.439	Tri.		3.494	
731	Tl(meso-C ₄ H ₉ O ₆).0.5H ₂ O	362.446	Tri.		3.518	
732	TlH(C ₂ H ₃ O ₂) ₂	323.454		64		
733	Tl ₂ (d-C ₄ H ₉ O ₆)	556.831	Trig.		4.80	558
734	Tl ₂ (meso-C ₄ H ₉ O ₆)	556.831	Tri.		5.110	899
735	Tl ₂ (dl-C ₄ H ₉ O ₆)	556.831	M.	165	4.66	957
736	Tl ₂ (d-C ₄ H ₉ O ₆).0.5H ₂ O	565.838	M.		4.60	
738	TlH(Cl ₂ CCO ₂) ₂	530.156	Tet.		2.822 ¹⁸	
739	TlH(CBr ₃ CO ₂) ₂	796.904	M.		3.923 ¹⁸	
740	TlOC ₆ H ₃ (NO ₂) ₃ —Picrate	432.440	M. (red) Tri. (yellow)		3.164 ¹⁷ 2.993 ¹⁸	
741	Tl(SbO)(d-C ₄ H ₉ O ₆).H ₂ O	508.216	R.		3.990	
742	TlCl ₂ PbCl ₂	796.090	C.	435		
743	TlGa(SO ₄) ₂ .12H ₂ O	682.435			2.477	110
744	ZnO—Zincite	81.3800	H.	>1800	5.606	392
745	ZnO	81.3800			5.47	
746	Zn(OH) ₂	99.3954	R.	d. 125	3.053	
747	ZnF ₂	103.380	M. Tri. ?	872	4.84 ¹⁸	
748	ZnF ₂ .4H ₂ O	175.442	R.	Tr. 100	2.535 ¹²	
749	ZnCl ₂	136.296	C.	365	2.91 ¹⁸	
750	Zn(ClO ₃) ₂ .4H ₂ O	304.357			2.15	
751	Zn(ClO ₄) ₂ .6H ₂ O	372.388			2.15	
752	ZnBr ₂	225.212	R.	394	4.219	
753	ZnI ₂	319.244	C.	446	4.666 ^{14,15}	
754	Zn(IO ₃) ₂	415.244		d.	4.98	
755	ZnS(α)—Würzite	97.4450	H.	1850 ^{180at.}	4.087	404
756	ZnS(β)—Sphalerite	97.4450	C.	Tr. 1020	4.102 ¹⁵	187
757	ZnSO ₄ —Zinkosite	161.445	R.	d. 740	3.74 ¹⁴	860
758	ZnSO ₄ .H ₂ O	179.460		d. 238	3.28 ¹⁸	
759	ZnSO ₄ .6H ₂ O	269.537	M.	Tr. 70.0	2.072 ¹⁵	
760	ZnSO ₄ .7H ₂ O—Goslarite	287.553	R.	Tr. 39.0	1.97	490
761	ZnS ₂ O ₆ .6H ₂ O	333.602	Tri.		1.915	
762	ZnSe	144.580	H.		5.42 ¹⁸	188.1

Ag 32 Al 55 As 13 Au 33

B 54 Ba 79 Be 15 Bi 5 Br 15

C 16 Ca 77 Cb 51 Cd 29 Ce 59

Cl 4 Co 44 Cr 46 Cu 35

Dy 67 Er 69 Eu 64 F 3 Fe 43

Ga 25 Gd 65 Ge 20 Gl 75 H 2

Hf 73 Hg 30 Ho 68 I 26

Ir 36 K 33 La 58 Li 31 Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
763	ZnSeO ₄ ·5H ₂ O	298.657	Tri.	d. >50	2.591	
764	ZnSeO ₄ ·6H ₂ O	316.672	Tet.	d.	2.325	252
765	ZnTe	192.880	C.	1238.5	5.54 ¹³	188.2
766	Zn(NO ₃) ₂	189.396		44.07		
767	Zn(NO ₃) ₂ ·3H ₂ O	243.442		45.5		
768	Zn(NO ₃) ₂ ·6H ₂ O	297.488	Tet.	36.4	2.065 ¹⁴	
769	ZnCl ₂ ·NH ₃	153.377				
770	ZnCl ₂ ·2NH ₃	170.358	R.	210.8		
771	ZnCl ₂ ·2NH ₄ Cl	243.290	R.		1.82	
772	Zn(ClO ₃) ₂ ·4NH ₃	300.420		exp. 205	1.84	
773	ZnBr ₂ ·2NH ₄ Br	421.122			2.625	
774	Zn(BrO ₃) ₂ ·4NH ₃	389.336		exp. 169	2.27	
775	Zn(IO ₃) ₂ ·4NH ₃	483.368		exp. 215	2.82	
776	ZnSO ₄ ·(NH ₄) ₂ SO ₄	293.588			2.25	
777	ZnSO ₄ ·(NH ₄) ₂ SO ₄ ·6H ₂ O	401.680	M.	d.	1.931	516
778	Zn(SeO ₄)·(NH ₄) ₂ SO ₄ ·6H ₂ O	495.950	M.		2.20	620
779	Zn ₃ P ₂	258.188	C.	>420	4.55 ¹³	
780	Zn ₃ (PO ₄) ₂	386.188	R.	900	3.998 ¹⁸	
781	Zn ₃ (PO ₄) ₂ ·4H ₂ O— α Hopeite	458.250	R.	Tr. >105	3.04	734
782	Zn ₃ (PO ₄) ₂ ·4H ₂ O— β Hopeite	458.250	R.	Tr. >140	3.03	720
783	Zn ₃ (PO ₄) ₂ ·4H ₂ O—Parahopeite	458.250	Tri.	Tr. >163		793
784	ZnH ₄ (PO ₄) ₂ ·2H ₂ O	295.490	Tri.	100 d.		
785	Zn ₂ (OH)PO ₄ —Tarbuttite	242.792	Tri.		4.13	898
786	Zn ₃ (PO ₄) ₂ ·Zn(OH) ₂ ·3H ₂ O—Spencerite	539.630	M.	d. 100	3.14	755
787	Zn ₂ P ₂ S ₆	385.198	H.		2.2	
788	ZnAs ₂	215.300		771		
789	Zn ₃ As ₂	346.060	C.	1015		
790	Zn ₂ As ₂ O ₇	392.680			4.701 ²¹	
791	Zn ₃ As ₂ O ₉	474.060	R.		4.913 ¹⁸	
792	Zn ₃ (AsO ₄) ₂ ·8H ₂ O—Koettigite	618.183	M.	d. 100	3.309 ¹⁸	881
793	4ZnO·As ₂ O ₃ ·H ₂ O—Adamite	573.455	R.	d. >100	4.345	918
794	ZnCO ₃ —Smithsonite	125.380	Trig.	d. 300	4.44	369
795	ZnC ₂ O ₄	153.380			2.58 ^{17, 5}	
796	ZnC ₂ O ₄ ·2H ₂ O	189.411		d. 100	2.562	
797	Zn(CH ₃) ₂	95.4262		— 40	1.1386 ¹⁰	
798	Zn(C ₂ H ₅) ₂	123.457		— 28	1.1182 ¹⁸	
799	Zn(C ₂ H ₇) ₂	151.488				
800	Zn(iso-C ₄ H ₁₁) ₂	207.549			1.1022 ⁰	
801	Zn(CHO ₂) ₂	155.395			2.36	
802	Zn(CHO ₂) ₂ ·2H ₂ O	191.426	M.		2.205	
803	Zn(C ₂ H ₅ O ₂) ₂	183.426		142	1.840	
804	Zn(C ₂ H ₅ O ₂) ₂ ·2H ₂ O	219.457	M.	237	1.735	518
805	Zn(L-C ₄ H ₇ O ₂) ₂ ·2H ₂ O— <i>l</i> -Malate	367.488	Tet.		1.701 ²⁰	
806	Zn(C ₂ H ₇ CO ₂) ₂	239.488	M.			535
807	5ZnO·2CO ₂ ·3H ₂ O—Hydrozincite	548.947	M. ?		3.7	920
808	Zn(CH ₃ SO ₃) ₂ ·3H ₂ O—Ethane disulfonate	307.587	Tri.		2.043	
809	ZnC ₁₀ H ₆ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene disulfonate	459.649	M.		1.793	791
810	Zn(CN) ₂	117.396	R.	d. 800		
811	ZnO·SiO ₂	141.440		1437	3.52	
812	2ZnO·SiO ₂ —Willemite	222.820	Trig.	1509	1.3.86 gla	
813	2ZnO·SiO ₂ ·H ₂ O—Calamine	240.835	R.		3.9	341
814	ZnSiF ₆ ·6H ₂ O	315.532	H.		3.45	780
815	ZnSiS ₃	125.505			2.104	209
816	ZnO·TiO ₂	161.280			3.41	
817	ZnO·3TiO ₂	321.080			3.17	
818	3ZnO·2TiO ₂	403.940			4.92 ¹⁵	
819	4ZnO·5TiO ₂	725.020			3.83	
820	Tl ₂ Zn(SO ₄) ₂ ·6H ₂ O	774.402	M.	d. 120	3.68 ¹⁹	771
821	CdO	128.410	C.		3.720	
822	Cd ₂ O	240.820		d.	8.15	
823	Cd(OH) ₂	146.425	Trig.	d. 300	8.192 ¹⁸	
					4.79 ¹⁴	

Mg Mn Ni N Na Nb Nd Ni O Os P Pb Pd Pr Pt Rn Rb Rh Ru S Se Sb Sc Se Si Sn Sr Tl Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 12 13 14 15 31 32 33 34 35 41 42 43 44 51 52 53 54 61 62 63 64 71 72 73 74 81 82 83 84 91 92 93 94 101 102 103 104 111 112 113 114 121 122 123 124 131 132 133 134 141 142 143 144

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
824	CdF ₂	150.410	C.	1100	6.64	
825	CdCl ₂	183.326	C.	568	4.047 ¹⁸	
826	CdCl ₂ .2.5H ₂ O.....	228.364	M.	Tr. 34	3.327	829
827	Cd(ClO ₃) ₂ .2H ₂ O.....	315.357		80		
828	CdCl ₂ .CdO.H ₂ O.....	329.751	H.	d. 280	4.56 ¹⁸	
829	CdBr ₂	272.242		583	5.192 ¹⁸	
830	Cd(BrO ₃) ₂ .2H ₂ O.....	404.273	R.		3.758	
831	CdO.CdBr ₂ .H ₂ O.....	418.667			4.87 ¹⁸	
832	CdI ₂ (α).....	366.274	H.	388	5.670 ¹⁰	
832. 1	CdI ₂ (β).....	366.274			5.305 ¹⁰	
833	Cd(IO ₃) ₂	462.274			6.48	
834	Cd(IO ₃) ₂ .H ₂ O.....	480.289		Tr. 160	6.43	
835	CdS—Greenockite.....	144.475	H.	1750 ¹⁰⁰ at.	4.820	406
836	CdSO ₄	208.475	R.	1000	4.691 ¹⁴	
837	CdSO ₄ .H ₂ O.....	226.490	M.	Tr. 108	3.786	
838	CdSO ₄ .2.66H ₂ O.....	256.583	M.	Tr. 41.5	3.090	688
839	CdSO ₄ .7H ₂ O.....	334.583	M.	Tr. 4	2.48	
840	CdS ₂ O ₆ .6H ₂ O.....	380.632	Tri.	d.	2.272	
841	CdSe.....	191.610	H.		5.81 ¹⁸	
842	CdSeO ₄ .2H ₂ O.....	291.641	R.	d. 100	3.632	
843	CdTe.....	239.910	C.	1041	6.20 ¹⁸	
844	Cd(NO ₃) ₂	236.426		350		
845	Cd(NO ₃) ₂ .4H ₂ O.....	308.488		59.4	2.455 ¹⁷	
846	CdCl ₂ .NH ₄ Cl.....	236.823	R.		2.93	
847	CdCl ₂ .4NH ₄ Cl.....	397.313	Trig.	Tr. — 20	2.01	296
848	CdCl ₂ .2NH ₄ OH.....	249.388		d. 130	2.72 ¹⁸	
849	Cd(ClO ₃) ₂ .6NH ₃	381.513		exp. 184	1.78	
850	Cd(BrO ₃) ₂ .4NH ₃	436.366		exp. 192	2.53	
852	Cd(IO ₃) ₂ .4NH ₃	530.398		exp.	3.23	
853	CdSO ₄ .(NH ₄) ₂ SO ₄	340.618		d.	3.11	
854	CdSO ₄ .(NH ₄) ₂ SO ₄ .6H ₂ O.....	448.710	M.	d. 100	2.067	500
855	CdSeO ₄ .(NH ₄) ₂ SeO ₄ .2H ₂ O.....	470.918	Tri.		3.376	
856	CdSeO ₄ .(NH ₄) ₂ SeO ₄ .6H ₂ O.....	542.980	M.	d. 20	2.307	
857	Cd ₃ P ₂ O ₇ .2H ₂ O.....	434.899		900	4.965 ¹⁸	
858	Cd ₃ (PO ₄) ₂	527.278		1500		
859	5CdO.2P ₂ O ₅ .5H ₂ O.....	1016.22	M.	d. 550	4.13 ¹⁸	
860	Cd(H ₂ PO ₄) ₂ .2H ₂ O.....	342.520	Tri.	d. 100	2.742 ¹⁸	
861	Cd ₃ (PO ₄) ₂ .2CdHPO ₄ .4H ₂ O.....	1016.22	M.	d. 600	4.06	
862	3Cd ₃ (PO ₄) ₂ .CdCl ₂	1765.16			5.46 ¹⁸	
863	Cd ₃ As ₂	487.150	C.		6.211	
864	Cd ₃ As ₂ O ₇	486.740			5.974	
865	CdHAsO ₄ .H ₂ O.....	270.393		d. >120	4.164 ¹⁸	
866	Cd(H ₂ AsO ₄) ₂ .2H ₂ O.....	430.392	Tri.	d. 75	3.241 ¹⁸	
867	CdSb.....	234.180		455		
868	CdCO ₃	172.410	Trig.	d. <500	4.258	
869	CdC ₂ O ₄	200.410		d. 340	3.32 ¹⁸	
870	Cd(CH ₃) ₂	142.456				
871	Cd(CHO ₂) ₂ .2H ₂ O.....	238.456	M.		2.44	
872	Cd(C ₂ H ₃ O ₂) ₂	171.433		256	2.341	
873	Cd(C ₂ H ₃ O ₂) ₂ .2H ₂ O.....	207.464	M.		2.01	
874	Cd(CH ₃ SO ₃) ₂ .2H ₂ O.....	336.602	Tri.		2.570	
875	Cd(CN) ₂	164.426		d. >200		
876	CdO.SiO ₂	188.470		1242	4.93	
877	2CdO.SiO ₂	316.880		1243		
878	HgO—Montroydite.....	216.610	R.	d. 100	11.14	1027
879	Hg ₂ O.....	417.220		d. 100	9.8	
880	HgF.....	219.610	C. ?	570	8.73	
881	HgF ₂	238.610	C.	645 d.	8.95	
882	HgCl—Calomel.....	236.068	Tet.	302	7.150	390
883	HgCl ₂ —Corrosive sublimate.....	271.526	R.	277	5.44	
884	HgClO ₃	284.068	R.	d. 250	1. 4.44 ²⁸⁰	

Ag 82 Al 55 As 13 Au 33

B 54 Ba 79 Be 75 Bi 15 Br 5

C 16 Ca 77 Ce 51 Cl 29 Co 59 Cr 29 Cu 59

Cl 44 Co 44 Cr 46 Cs 31

Dy 69 Er 69 Eu 64 F 3 Fe 43

Ga 25 Gd 65 Ge 20 Gl 75 H 2

Hf 73 Hg 80 Ho 68 I 6 In 26

K 39 La 57 Li 3 Na 11 Pb 82 Pt 78 Rb 37

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
885	HgClO ₄ ·6H ₂ O.....	408.160		d. 150	4.28	
886	Hg(ClO ₄) ₂ ·7H ₂ O.....	525.634		34 d.	2.78	
887	Hg ₂ ClO—Terlinguaite.....	452.678	M.	d.	8.725	1070
888	HgCl ₂ ·2HgO.....	704.746	H.	d.	red 8.3	
			M.	d.	black 8.5	
889	HgO·2HgCl ₂	759.662			6.42	
890	Hg ₂ O·2HgCl—Eglestonite.....	889.356	C.		8.33	195
891	HgCl ₂ ·3HgO—Kleinite.....	921.356	H.	d. 260	7.93	
892	HgCl ₂ ·4HgO.....	1137.97	H.		9.10	
893	HgBr.....	280.526			7.307	
894	HgBr ₂	360.442	R.	237	6.053	
					l. 5.12 ²⁴⁰	
895	HgBr ₂ ·4HgO.....	1226.88	R.	d. 230	8.73	
896	HgI.....	327.542	Tet.	290 d.	7.70	
897	HgI ₂ (red).....	454.474	Tet.	Tr. 127	6.283	
898	HgI ₂ (yellow).....	454.474	R.	259	6.271	
					l. 5.24 ²⁴⁵	
899	Hg ₂ Cl ₂ I ₂	726.000	R.	153		
900	HgS—Metacinnabarite.....	232.675	C.		7.50	
901	HgS (α)—Cinnabarite.....	232.675	H.		8.10	411
902	HgS (β).....	232.675	H.		7.73	
903	HgSO ₄	296.675	R.	d.	6.47	
904	Hg ₂ SO ₄	497.285	M.	d.	7.56	
904.1	Hg ₂ SO ₄ Cl ₂	568.201		270		
904.2	Hg ₂ SO ₄ Br ₄	816.949		d. 125		
904.3	Hg ₂ SO ₄ I ₂	751.149		248		
905	HgSO ₄ ·3HgS.....	994.700		d. 120	6.416	
906	Hg ₂ SeO ₃	528.420		180 d.		
907	HgNO ₃	246.618		d. 140	5.925	
908	HgNO ₃ ·H ₂ O.....	280.633	M.	70	4.785 ^{2.9}	
909	Hg(NO ₃) ₂ ·0.5H ₂ O.....	333.634		79	4.3	
910	Hg ₂ (NO ₃) ₂	461.236		d. 100	7.33	
911	(HgOH) ₂ ·NH ₂ OH.....	468.267			4.083	
912	HgCl ₂ ·N ₂ H ₄ ·HCl.....	340.039		157		
913	HgCl ₂ ·2NH ₄ Cl·H ₂ O.....	396.535	R.		2.84	
914	HgCl ₂ ·12NH ₃	475.899		— 9 P.		
914.1	Hg ₂ (NO ₃) ₂ Cl ₄	667.068		d. 100		
915	HgBr ₂ ·2N ₂ H ₄ ·HBr·H ₂ O.....	603.475		73		
916	NHg ₂ Br·3NH ₄ Br.....	789.008	R.	180 d.		
916.1	Hg ₂ (NO ₃) ₂ I ₄	1032.96		250		
917	HgS·2Sb ₂ S ₃ —Livingstonite.....	912.145	R.		4.81	1029
918	Hg(CH ₃) ₂	230.656			l. 3.069	53
919	Hg(C ₂ H ₅) ₂	258.687			l. 2.444	54
920	Hg(C ₂ H ₇) ₂	286.718			l. 2.124 ¹⁶	
921	Hg(iso-C ₄ H ₉) ₂	314.748			l. 1.835 ¹⁵	
922	Hg(C ₆ H ₅) ₂	354.687		121.8	2.318	
923	Hg(C ₁₀ H ₇) ₂ —Mercury α-naphthyl.....	454.718		188	1.929	
924	Hg(C ₂ H ₅ O ₂) ₂	318.656		d.	3.270	
925	Hg(C ₂ H ₅ O ₂) ₂	346.687		110		
926	Hg(C ₇ H ₅ O ₂) ₂	442.687		165		
927	Hg(C ₁₈ H ₃₃ O ₂) ₂ —Oleate.....	763.118		103		
928	Hg ₂ (C ₂ H ₅ O ₂) ₂	547.297		225 d.		
929	HgCH ₃ Cl.....	251.091		170	4.063	
930	HgC ₂ H ₅ Cl.....	265.107		193	3.482	
931	HgCH ₃ I.....	342.565		143		
932	Hg(C ₂ H ₅ S) ₂	322.817		77		
933	Hg(CN) ₂	252.626	Tet.		4.00	
934	CuO—Paramelaconite.....	79.5700			6.4	
935	CuO—Tenorite.....	79.5700	C.	d. 1026 ¹⁵³ mm O ₂	6.40	1078
936	Cu ₂ O—Cuprite.....	143.140	C.	1235 ^{0.6} mm O ₂	6.0	188
937	CuF.....	82.5700		908		
938	CuF ₂ ·5HF·6H ₂ O.....	309.701	M.	d.	2.405	
939	CuCl—Nantokite.....	99.0280	C.	422	3.53	173

Mg	Mn	Mo	Ni	Na	Nb	Nd	NI	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr		
78	42	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
940	CuCl ₂	134.486		498	3.054	
941	CuCl ₂ ·2H ₂ O.....	170.517	R	110 d.	2.390 ^{12,4}	883
942	Cu(ClO ₃) ₂ ·6H ₂ O.....	338.578	C. ?	65		
943	Cu(ClO ₄) ₂ ·7H ₂ O.....	388.594			1.955	
944	3CuO·CuCl ₂ ·3H ₂ O—Atacamite.....	427.242	R.	d. 200	3.94	1033
945	3CuO·CuCl ₂ ·3H ₂ O—Paratacamite.....	427.242	Trig.	d. 200	3.74	172
946	4CuO·Cl ₂ O ₈ ·3H ₂ O.....	523.242	R. M. ?	d.	3.55	
947	CuBr.....	143.486	C.	504	4.72	
948	CuBr ₂	223.402	M.	498		
949	CuBr ₂ ·4H ₂ O.....	295.464	R.	Tr. 30		
950	Cu(BrO ₃) ₂ ·6H ₂ O.....	427.494	C.	d. 180	2.583	
951	CuI—Marshallite.....	190.502	C. Tet.	605	5.62	186
952	Cu(IO ₃) ₂	413.434	M.	d.	5.241 ¹⁵	
953	Cu(IO ₃) ₂ ·H ₂ O.....	431.449	Tri.	d. 240	4.876 ¹⁵	
954	Cu(IO ₃)OH.....	255.510	R.	d. 290	4.878 ¹⁵	
955	CuS—Covellite.....	95.6350	H. M. ?	Tr. 103	4.6	
956	Cu ₂ S—Chalcocite.....	159.205	R.	1100	5.6	
957	Cu ₂ S.....	159.205	C.	1130	5.783	
958	CuSO ₄ —Hydrocyanite.....	159.635	R.	200	3.6	
959	CuSO ₄ ·H ₂ O.....	177.650		d. 221	3.17	
960	CuSO ₄ ·3H ₂ O.....	213.681	M.		2.663	
961	CuSO ₄ ·5H ₂ O—Chalcantite.....	249.712	Tri.	d. 20	2.286 ^{15,6}	641
962	CuSO ₄ ·7H ₂ O—Boothite.....	285.743	M.		1.944 ²¹	
963	Cu ₂ SO ₃ ·H ₂ O.....	225.220	H.		3.83 ¹⁵	
964	3CuO·SO ₃ ·2H ₂ O—Antlerite.....	354.806	R.		3.9	921
965	Cu ₂ SO ₃ ·CuSO ₃ ·2H ₂ O.....	386.871		d. 150	3.57	
966	4CuO·SO ₃ ·3H ₂ O—Brochantite.....	452.391	R.		3.907	944
967	4CuO·SO ₃ ·4H ₂ O—Langite.....	470.407	R.		3.49	939
968	7CuO·2SO ₃ ·5H ₂ O.....	807.197	R.		3.85	
969	20CuO·SO ₃ ·2CuCl ₂ ·20H ₂ O—Connellite.....	2300.75	H.		3.4	350
970	Cu ₂ Se.....	206.340	C.	1113	6.749 ²⁰	
971	Cu ₂ Se ₃ —Umangite.....	349.110			5.620	
972	CuO·SeO ₂ ·2H ₂ O—Chalcomenite.....	226.801	M. R. ?		3.76	916
973	CuSeO ₄ ·5H ₂ O.....	296.847	Tri.		2.559	
974	Cu(NO ₃) ₂ ·3H ₂ O.....	241.631		114.49	2.047	
975	Cu(NO ₃) ₂ ·6H ₂ O.....	295.678		26.4 d.		
976	4CuO·N ₂ O ₈ ·3H ₂ O—Gerhardite.....	480.342	R.		3.43	903
977	CuCl ₂ ·2NH ₄ Cl.....	241.480			1.905 ^{11,6}	
978	CuCl ₂ ·2NH ₄ Cl·2H ₂ O.....	277.510	Tet.	d. 110	1.98	354
979	CuCl ₂ ·3NH ₃	150.121		123		
980	2CuCl ₂ ·NH ₃	215.087		162		
981	2CuCl ₂ ·3NH ₃	249.149		144		
982	3CuCl ₂ ·10NH ₃	573.769		270		
983	Cu(ClO ₃) ₂ ·4NH ₃	298.610		d. 90	1.81	
984	CuBr ₂ ·2NH ₃	257.464		d. 200		
985	CuBr ₂ ·3NH ₃	194.579		115		
986	2CuBr ₂ ·3NH ₃	338.065		135		
987	Cu(BrO ₃) ₂ ·4NH ₃	387.526		exp. 140	2.31	
988	CuI ₂ ·3NH ₃	241.595		105		
989	2CuI ₂ ·3NH ₃	432.097		117		
990	Cu(IO ₃) ₂ ·5NH ₃	498.590		exp. 215	2.72	
991	(NH ₄) ₂ SO ₄ ·CuSO ₄	291.778			2.348	
992	(NH ₄) ₂ SO ₄ ·CuSO ₄ ·6H ₂ O.....	399.870	M.	d. 120	1.87	538
993	(NH ₄) ₂ SeO ₄ ·CuSeO ₄ ·6H ₂ O.....	494.140	M.		2.22	639
994	CuP.....	94.5940			5.14	
995	Cu ₂ P.....	158.164		d.	6.4	
996	Cu ₃ P ₂	252.758		d.	6.67	
997	4CuO·P ₂ O ₅ ·H ₂ O—Libethenite.....	478.343	R.		3.7	932
998	4CuO·P ₂ O ₅ ·2H ₂ O—Pseudolibethenite.....	496.359			4.0	
999	4CuO·P ₂ O ₅ ·3H ₂ O—Tagilite.....	514.374			4.08	968
1000	5CuO·P ₂ O ₅ ·2H ₂ O—Dihydrite.....	575.929	M. Tri.		4.2	940
1001	6CuO·P ₂ O ₅ ·3H ₂ O—Phosphochalite.....	673.514			4.4	
1002	Cu(H ₂ PO ₃) ₂	193.649		exp. 90		

Ag	Al	As	Au	B	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	La	Li	Mn	Nb	Ni	P	Pb	Pr	Sb	Se	Si	Sn	Sr	Ta	Tb	Ti	Tl	Tm	U	V	Zn	Zr
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	66	6	36	38	39	57	51	72	28	50	82	14	60	80	48	74	90	88	70	92	86	76	94	84

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1003	CuPO ₄ .CuOH.....	239.172	R.			931
1004	Cu ₃ As—Domeykite.....	265.670	H.	830	8.00	
1005	3CuO.As ₂ O ₃ .5H ₂ O—Trichalcite.....	558.707	R.			885
1006	4CuO.As ₂ O ₃ .H ₂ O—Olivenite.....	566.215	R.		4.3	951
1007	4CuO.As ₂ O ₃ .3H ₂ O—Leucochalcite.....	602.246	R.			960
1008	4CuO.As ₂ O ₃ .7H ₂ O—Euchroite.....	674.308	R.		3.40	891
1009	5CuO.As ₂ O ₃ .H ₂ O—Erinite.....	645.785			4.04	964
1010	6CuO.As ₂ O ₃ .3H ₂ O—Clinoclasite.....	761.386	M.		4.37	976
1011	7CuO.As ₂ O ₃ .14H ₂ O—Chalcophyllite.....	1039.12	Trig.		2.66	306
1012	5CuO.As ₂ O ₃ .9H ₂ O—Tyrolite.....	789.909	R.		3.05	912
1013	2Cu ₂ S.As ₂ S ₃	564.525			4.289	
1014	3Cu ₂ S.As ₂ S ₃ —Enargite.....	787.860	C.		4.40	
1015	3Cu ₂ S.2As ₂ S ₃ —Binnite.....	969.845	C.		4.48	
1016	Cu ₃ (AsO ₄) ₂ .3NH ₃ .4H ₂ O.....	591.785	Tri.		3.05	
1017	Cu ₃ Sb (β).....	312.480		687 Tr. 407 (β to α) 830	8.51 (β) 8.48 (α)	
1018	Cu ₃ Sb ₂	561.390				
1019	Cu ₂ S.Sb ₂ S ₃ —Chalcostibite.....	498.940	R.		4.932	
1020	Cu ₂ S.2Sb ₂ S ₃ —Guejarite.....	838.675	R.		4.814	
1021	3Cu ₂ S.Sb ₂ S ₃ —Stylotypite.....	817.350			5.147	
1022	Cu ₂ S.Bi ₂ S ₃ —Emplectite.....	673.400	R.		6.10 ¹⁵	
1023	5Cu ₂ S.2Bi ₂ S ₃ —Wittichenite.....	1824.42			5.9 ¹⁵	
1024	2Cu ₂ S.Bi ₂ S ₃ .2BiSCl.....	1385.7			6.78	
1025	2Cu ₂ S.Bi ₂ S ₃ .2BiSBr.....	1474.6			6.41	
1025.1	20CuO.Bi ₂ O ₃ .5As ₂ O ₃ .22H ₂ O—Mixite.....	3603.34			3.79	352
1026	2CuO.CO ₂ —Mysorine.....	203.140			4.398	
1027	2CuO.CO ₂ .H ₂ O—Malachite.....	221.155	M.		4.0	977
1028	3CuO.2CO ₂ .H ₂ O—Azurite.....	344.725	M.	d. 220	3.88	938
1029	Cu(CHO ₂) ₂	153.585			1.831	
1030	Cu(CHO ₂) ₂ .4H ₂ O.....	225.647	M		1.795	652
1031	Cu(C ₂ H ₃ O ₂) ₂	181.616			1.930	
1032	Cu(C ₂ H ₃ O ₂) ₂ .H ₂ O.....	199.632		115	1.882	667
1033	Cu(C ₂ H ₃ O ₂) ₂ .2H ₂ O.....	217.647		d. 240	1.9	
1034	Cu(CH ₃ SO ₃) ₂ .4H ₂ O—Ethane disulfonate.....	323.790	Tri.		2.061	
1035	CuC ₁₀ H ₈ O ₈ .6H ₂ O—1, 5-Naphthalene disulfonate.....	457.839	M.		1.783	792
1036	CuCN.....	89.5780	M.	474.5		
1037	CuC ₂ O ₄ .2NH ₃	185.632			2.305 ¹⁵ (α) 2.225 ¹⁵ (β)	
1038	CuSCN.....	121.643			2.846 ¹⁵	
1039	Cu ₂ (NH ₃) ₂ (SCN) ₂	277.348	R.	d. 20	1.021 ¹⁵	
1040	Cu ₂ Si.....	155.200			6.9 ¹⁵	
1041	Cu ₄ Si.....	282.340		850	7.53	
1042	Cu ₄ Si ₂	373.970		775		
1043	CuO.SiO ₂ .H ₂ O—Bisbeeite.....	157.645	R.			783
1044	CuO.SiO ₂ .H ₂ O—Diopside.....	157.645	Trig.		3.05	319
1045	2CuO.2SiO ₂ .H ₂ O—Shattuckite.....	297.275	M.			948
1046	6CuO.5SiO ₂ .2H ₂ O—Plancheite.....	813.751	M.		3.36	320
1047	CuSiF ₆ .6H ₂ O.....	313.722	R.		2.158 ¹⁹	211
1048	CuCl ₂ .PbO.H ₂ O—Percylite.....	375.701	C.		4.67 ^{18.7}	176
1049	2CuO.5PbO.3SO ₃ .CO ₂ .3H ₂ O—Linarite.....	1613.38	M.		5.4	967
1050	CuO.4PbO.P ₂ O ₅ —Tsumebite.....	1114.42	R.		6	987
1051	Cu ₂ S.2PbS.Bi ₂ S ₃ —Aikinite.....	1151.93	R.		6.45	
1053	5Cu ₂ S.2ZnS.2As ₂ S ₃ —Tennantite.....	1483.14	C.		4.4	198
1054	Cu ₂ HgI ₄	835.478			6.096 ⁹	
1055	CuCl.HgS.....	331.703			6.29	
1056	Ag ₂ O.....	231.760	C.	d. 300	7.143 ^{16.6}	
1057	Ag ₂ O ₂	247.760		d. >100	7.44	
1058	AgF.....	126.880	C.	435	5.852 ^{15.5}	
1059	AgCl—Cerargyrite.....	143.338		455	5.56	177
1060	AgClO ₃	191.338	Tet.	230	4.430	
1061	AgClO ₄	207.338		d. 486		
1062	AgBr—Bromyrite.....	187.796	C.	434	6.474	185

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Str	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr		
76	48	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1063	AgBrO ₃	235.796	Tet.	d.	5.206	372
1064	AgI—Iodyrite.....	234.812	H.	d. 552	5.67	400
1065	AgIO ₃	282.812	R.	>200	5.525	
1066	Ag ₂ S—Acanthite.....	247.825	R.	825	7.326	
				Tr. 175		
1067	Ag ₂ S—Argentite.....	247.825	C.	Tr. 175	7.317	
1068	Ag ₂ SO ₄	311.825	R.	652	5.45 ^{19,2}	
1069	Ag ₂ S ₂ O ₈ ·2H ₂ O.....	411.921	R.		3.61	844
1070	Ag ₂ Se—Naumannite.....	294.960		880	8.0	
1071	Ag ₂ SeO ₃	342.960			5.929	
1072	Ag ₂ Te—Hessite.....	343.260	C.	955	8.5	
1073	AgN ₃	149.904		exp. 251.5		
1074	AgNO ₂	153.888	R.	d. 140	4.453 ²⁶	
1075	AgNO ₃	169.888	R.	212	4.352 ¹⁹	1050
1076	Ag ₂ (NO ₃) ₂	275.776		d. 110	5.75 ²⁰	
1077	AgNO ₃ ·NH ₃	170.919	Tet.	70 d.		
1078	NH ₄ NO ₃ ·AgNO ₃	249.935	R.	109.6		
1079	Ag(NH ₃) ₂ NO ₃	203.950	R.	170 d.		
1080	AgCl·AgNO ₃	313.226		160		
1081	2AgCl·3NH ₃	337.769	R.	68 d.		
1082	AgI·AgNO ₃	404.700	R.	94		
1083	AgI·2AgNO ₃	574.588	R.	119.1		
1084	AgBr·NH ₄ Br·4(NH ₄) ₂ S ₂ O ₈	878.580	Tet.			336
1085	Ag ₂ P ₃	308.832		d.	4.63	
1086	AgPO ₃	186.904		482	6.370	
1087	Ag ₂ PO ₄	418.664	C.	849	6.370 ²⁴	
1088	Ag ₄ P ₂ O ₇	605.568		585	5.306 ^{7,4}	
1089	Ag ₂ HPO ₄	311.792	Trig.	d. 110		366
1090	Ag ₂ AsO ₃	446.600		150 d.		
1091	Ag ₂ AsO ₄	462.600	C.		6.657 ²⁴	
1092	Ag ₂ AsBr ₂	638.348		d.	5.55 ¹⁴	
1093	Ag ₂ S·As ₂ S ₃ —Smithite.....	493.940	M.		4.700	1066
1094	Ag ₂ S·As ₂ S ₃ —Treichmannite.....	493.940	Trig.		4.700	422
1095	3Ag ₂ S·As ₂ S ₃ —Proustite.....	989.590	Trig.		5.49	412
1096	3Ag ₂ S·As ₂ S ₃ —Xanthoconite.....	1053.72	R.		5.2	1030
1097	Ag ₂ S·Sb ₂ S ₃ —Miargyrite.....	587.560	M.		5.36 ¹⁷	
1098	3Ag ₂ S·Sb ₂ S ₃ —Pyrargyrite.....	1083.21	Trig.		5.76	425
1099	3Ag ₂ S·Sb ₂ S ₃ —Pyrostilpnite.....	1083.21	M. Tri.		5.790 ¹⁷	
1100	5Ag ₂ S·Sb ₂ S ₃ —Stephanite.....	1578.86	R.		6.3	
1101	8Ag ₂ S·Sb ₂ S ₃ —Polybasite.....	2322.34	R.		6.1	1031
1102	12Ag ₂ S·Sb ₂ S ₃ —Polyargyrite.....	3313.64	R.		6.50	
1103	Ag ₂ S·Bi ₂ S ₃ —Matildite.....	762.020	R.		6.9	
1104	AgNO ₃ ·Bi(NO ₃) ₃ ·2NH ₄ NO ₃	629.006			3.055 ¹⁴	
1105	Ag ₂ CO ₃	275.760		218 d.	6.077	
1106	Ag ₂ C ₂ O ₄	303.760		exp. 140	5.029 ⁴	
1107	AgC ₂ H ₃ O ₃	166.903		d.	3.259 ¹⁴	
1108	AgC ₂ H ₃ O ₃ ·0.5H ₂ O—Lactate.....	205.995		100		
1109	Ag ₂ (d-C ₄ H ₇ O ₆).....	363.791		d.	3.432 ¹⁴	
1110	Ag ₂ (dl-C ₄ H ₇ O ₆).....	363.791			3.775 ¹⁴	
1111	AgCN.....	133.888		320 d.	3.95	
1112	AgCNO.....	149.888		d.	4.00	
1113	AgCN·NH ₃	150.919	M.	102 d.		
1114	Ag(SbO)(d-C ₄ H ₇ O ₆)·H ₂ O.....	364.886	R.		3.481 ^{14,2}	
1115	4Ag ₂ S·GeS ₂ —Argyrodite.....	1127.81	C.		6.085 ¹⁴	
1116	4Ag ₂ S·SnS ₂ —Canfieldite.....	1174.13	C.		6.28	
1117	Ag ₂ S·2As ₂ S ₃ ·6PbS—Lengenbachite.....	2175.65	Tri.		5.8	
1118	3Ag ₂ S·4PbS·3Sb ₂ S ₃ —Diaphorite.....	2719.74	R.		5.9	
1119	3Ag ₂ S·4PbS·3Sb ₂ S ₃ —Freieslebenite.....	2719.74	M.		6.3	
1120	AgNO ₃ ·2TiNO ₃ ·Bi(NO ₃) ₃	1001.73			4.87 ¹⁴	
1121	AgCl·HgCl.....	379.406			6.495	
1122	2AgI·HgI ₂	924.098		Tr. 45	5.998 ⁰	
1123	4AgI·CuI—Miersite.....	1129.75			5.64	183
1124	Ag ₂ S·Cu ₂ S—Stromeyerite.....	407.030	R.		6.2	

Ag 32
Al 55
As 13
Au 33

B 54
Ba 79
Be 15
Bi 5

C 16
Ca 77
Cb 51
Cd 29
Co 59

Cl 4
Co 44
Cr 46
Cu 31

Dy 67
Er 69
Eu 64
F 3
Fe 43

Ga 25
Gd 65
Ge 20
Gl 75
H 2

Hf 73
Hg 80
Ho 68
I 6
In 26

Ir 36
K 39
La 38
Nb 34
Ni 58
P 31
Pt 78
S 16
Se 34
Si 14
Sn 50
Ta 73
Te 52
Th 90
Ti 48
Tl 81
U 92
V 23
W 74
Xe 54
Y 39
Zn 65
Zr 90

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1125	Au ₂ O.....	410.400		d. 20s		
1126	Au ₂ O ₂	426.400		d. 18o		
1127	Au ₂ O ₃	442.400		d. 16o		
1128	AuCl.....	232.658		d. 289.5	7.4	
1129	AuCl ₂	303.574		254 d.	3.9	
1130	Au ₂ Cl ₄	536.232		d. 25o	5.1	
1131	AuBr.....	277.116		d. 115		
1132	AuBr ₂	436.948		16o d.		
1133	Au ₂ Br ₄	714.064		d. 115		
1134	AuHBr ₄ .5H ₂ O.....	607.949		27		
1135	AuI.....	324.132		d. 120		
1136	Au ₂ S ₂	458.530		d. 14o		
1137	Au ₂ S ₃	490.595		d. 197	8.754	
1138	Au ₂ Se ₃	632.000			4.65 ¹²	
1139	AuTe—Calaverite.....	324.700	Tri.		9.04	
1140	Au ₂ Te ₄	904.400		472		
1141	HAu(NO ₃) ₄ .3H ₂ O.....	500.286		72 d.	2.84	
1142	Au ₂ O ₃ .4NH ₃	510.524		exp. 143		
1143	Au ₂ P ₃	487.472			6.67	
1144	Au(CN) ₃ .3H ₂ O.....	329.270		d. 50		
1145	4AuCl ₃ .3AgCl.8NH ₄ Cl.....	2072.28	R.			159
1146	OsO ₂	222.800			7.91	
1147	OsO ₄ (yellow).....	254.800	M.	41	4.91	
					1. 4.44 ^{40.1}	57
1147.5	OsO ₄ (white).....	254.800		39.5		
1148	OsF ₆	304.800				
1149	OsF ₈	342.800		34.5		
1150	(NH ₄) ₂ OsCl ₆	439.626	C.		2.93	
1151	(NH ₄) ₂ OsBr ₆	706.374			4.09	
1152	IrCl.....	228.558		d. 798	10.18	
1153	IrCl ₂	264.016		d. 773		
1154	IrCl ₃	299.474		d. 763	5.30	
1155	(NH ₄) ₂ IrCl ₆	441.926	C.		2.856	
1156	IrCl ₄ NH ₃ .H ₂ O.....	314.698	Trig.			327
1157	[Ir(NH ₃) ₅ Cl]Cl ₂	384.630	R.		2.675	
1158	[Ir(NH ₃) ₅ Br]Br ₂	518.004	R.		3.245 ^{14.5}	
1159	[Ir(NH ₃) ₅ Cl]Br ₂	473.546	R.		3.01	
1160	[Ir(NH ₃) ₅ I]I ₂	659.052	R.		3.586 ^{15.5}	
1161	[Ir(NH ₃) ₅ Cl]I ₂	567.578	R.		3.12	
1162	Ir ₂ (SO ₄) ₃ .(NH ₄) ₂ SO ₄ .24H ₂ O.....	1238.91	C.	106		
1163	PtCl ₂	266.146		d. 581	5.87	
1164	PtCl ₄ .8H ₂ O.....	481.185			2.43	
1165	H ₂ PtCl ₆ .6H ₂ O.....	518.086		60	2.431	
1166	PtBr ₄	514.894		d. 180		
1167	H ₂ PtBr ₆ .9H ₂ O.....	838.880	M.	<100 d.		
1168	PtI ₄	702.958		d. 100		
1169	PtS.....	227.295			8.897	
1170	PtSe ₂	353.630			7.65	
1171	PtSe ₃	432.830			7.15	
1172	Pt(NH ₃) ₄ (OH) ₂	297.370		110 d.		
1173	Pt(NH ₃) ₂ Cl ₂	300.208	R.	d. 270		
1174	(NH ₄) ₂ PtCl ₆	444.056	C.		3.065	
1175	[Pt(NH ₃) ₄]Cl ₂ .H ₂ O.....	352.286	Tet.	d. 110	2.737	
1176	(NH ₄) ₂ PtBr ₆	710.804	C.		4.265	
1177	(NH ₄) ₂ PtI ₆	992.900	C.		4.61	
1178	PtP ₂ O ₇	369.278		d. >600	4.856	
1179	PtAs ₂ —Sperrylite.....	345.150	C.	>800	10.60	
1180	[Pt(CO)Cl ₂] ₂	588.292		195		
1181	2PtCl ₂ .3CO.....	616.292	M.	130		
1182	[Pt(CO)Br ₂] ₂	766.124	M.	182		
1183	[Pt(CO)I ₂] ₂	954.188		ca. 150 d.		
1184	[CH ₃ (C ₂ H ₅) ₂ SCl] ₂ PtCl ₄	618.308	M.	210		888
1185	[(C ₂ H ₅) ₂ SCl] ₂ PtCl ₄	646.339	M.			811

Li	Be	B	C	N	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Zr	Nb	Mo	Pd	Ag	Cd	In	Sn	Pb	Bi	Po	At	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																																		
7	4	5	6	7	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																												
1186	$[(C_2H_5NH_2)_2H_2PtCl_6]$	500.117		218 d.	2.275 ¹⁸	139																												
1187	$[(CH_3)_2N]_2H_2PtCl_6$	528.148		245 d.	2.015																													
1188	$[CH_2(C_2H_5)NH]_2H_2PtCl_6$	528.148		208	2.115 ¹⁸																													
1189	$[C_2H_7NH_2]_2H_2PtCl_6$	528.148		214	2.218																													
1190	$[(iso-C_2H_7)NH]_2H_2PtCl_6$	528.148		228	2.229																													
1191	$[(CH_3)_2N]_2PtCl_6$	556.179	C.	278 d.	1.811 ¹⁶																													
1192	$[CH_2(C_2H_7)NH]_2H_2PtCl_6$	556.179		200 d.	1.968 ¹⁸																													
1193	$[(CH_3)_2C_2H_5N]_2PtCl_6$	584.210	C.	266 d.	1.762 ¹⁷																													
1194	$[(C_2H_5)_2C_2H_7NH]_2H_2PtCl_6$	584.210		199	1.89																													
1195	$[C_2H_5(iso-C_2H_7)NH]_2H_2PtCl_6$	584.210		180	1.885																													
1196	$[C_2H_5(iso-C_4H_9)NH]_2H_2PtCl_6$	612.240		201 d.	1.804																													
1197	$[(C_2H_5)_2N]_2H_2PtCl_6$	612.240		100	1.903																													
1198	$[(C_2H_7)_2NH]_2H_2PtCl_6$	612.240		175 d.	1.704 ¹⁸																													
1199	$[(CH_3)_2C_2H_7N]_2PtCl_6$	612.240	C.	252 d.	1.821																													
1200	$[(CH_3)_2(iso-C_2H_7)N]_2PtCl_6$	612.240	C.	237	1.871 ¹⁶																													
1201	$[(C_2H_7)(iso-C_4H_9)NH]_2H_2PtCl_6$	640.271		188	1.702 ¹⁸																													
1202	$[(CH_3)(C_2H_5)_2N]_2PtCl_6$	640.271	C.	250 d.	1.731																													
1203	$[(CH_3)_2(C_2H_5)(C_2H_7)N]_2PtCl_6$	640.271	C.	256 d.	1.812																													
1204	$[(CH_3)_2(C_4H_9)N]_2PtCl_6$	640.271	C.	259 d.	1.795																													
1205	$[(CH_3)_2(iso-C_4H_9)N]_2PtCl_6$	640.271	C.	220	1.751 ¹⁷																													
1206	$[(CH_3)_2(C_2H_7)_2N]_2H_2PtCl_6$	640.271		>200	1.737																													
1207	$[(C_2H_5)_2N]_2PtCl_6$	668.302	C.	250 d.	1.776																													
1208	$[(iso-C_4H_9)_2NH]_2H_2PtCl_6$	668.302		213	1.62 ¹⁸																													
1209	$[(C_2H_5)(C_2H_7)_2N]_2H_2PtCl_6$	668.302		175	1.726																													
1210	$[(CH_3)_2(C_2H_7)_2N]_2PtCl_6$	668.302	Tet.	250	1.745																													
1211	$[(C_2H_5)_2(C_2H_7)N]_2PtCl_6$	696.333	C.	235 d.	1.710																													
1212	$[(CH_3)(C_2H_5)(C_2H_7)_2N]_2PtCl_6$	696.333	C.	228 d.	1.712																													
1213	$[(C_2H_5)_2(C_2H_7)_2N]_2PtCl_6$	724.364	C.	220 d.	1.677																													
1214	$[(CH_3)(C_2H_5)(C_2H_7)(iso-C_4H_9)N]_2PtCl_6$	724.364		236 d.	1.637																													
1215	$[(C_2H_5)_2(C_4H_9)N]_2PtCl_6$	724.364	C.	220	1.629 ¹⁸																													
1216	$[(C_2H_5)_2(iso-C_4H_9)N]_2PtCl_6$	724.364	M.	215	1.602																													
1217	$[(C_2H_5)(C_2H_7)_2N]_2PtCl_6$	752.394	Tri.	212	1.571 ¹⁷																													
1218	$[(C_2H_7)_2N]_2PtCl_6$	780.424	Tri.	199	1.515																													
1219	$[(CH_3)(iso-C_4H_9)_2N]_2PtCl_6$	808.456	R. ?	174	1.696																													
1220	$[(C_2H_5)(iso-C_4H_9)_2N]_2PtCl_6$	836.487	Tet.	170	1.562 ¹⁷																													
1221	$[(C_2H_7)(iso-C_4H_9)_2N]_2PtCl_6$	864.518	C.	168	1.509																													
1222	$Pt_x(NO_3)_y(C_8H_8S_6)_z$	Tschugaeff	and Chlopin	93, 82: 402; 12.																														
1223	PtSi	223.290		1100	11.63 ¹⁸																													
1224	Pt ₂ Si	418.520			13.8 ¹⁸																													
1225	Pt ₃ Si	641.810			14.1																													
1226	PtPbCl ₆ ·4H ₂ O	687.240	C.		3.681																													
1227	PtPbBr ₆	881.926		d. >120	6.025																													
1228	PtZnCl ₆ ·6H ₂ O	581.450	Trig.		2.717																													
1229	PtZnBr ₆ ·12H ₂ O	956.291	Trig.		2.877																													
1230	PtZnI ₆ ·9H ₂ O	1184.34	Trig.		3.689																													
1231	PtCdCl ₆ ·6H ₂ O	628.480	Trig.		2.882																													
1232	PtCuCl ₆ ·6H ₂ O	579.964	Trig.		2.734																													
1233	RuO ₂	133.700	Tet.		7.2																													
1234	RuO ₄	165.700		25.5	5.77 ¹⁰⁰																													
1235	Ru ₂ S ₃ —Laurite	299.595	C.		6.99																													
1236	RuSi	129.760			5.4																													
1237	$[Rh_2(NH_3)_{10}Cl_2]Cl_4$	588.879	R.	d. 200	2.079 ¹⁸																													
1238	$[Rh(NH_3)_5Br]Br_2$	427.814	R.		2.65																													
1239	$[Rh(NH_3)_5I]I_2$	568.862	R.		3.12 ¹⁸																													
1240	NH ₄ Rh(SO ₄) ₃ ·12H ₂ O	529.264	C.	103		115																												
1241	TiRh(SO ₄) ₃ ·12H ₂ O	715.625	C.			130																												
1242	RbRh(SO ₄) ₃ ·12H ₂ O	596.665	C.	109																														
1243	PdO	122.700		d. 877																														
1244	PdCl ₂	177.616		500																														
1245	PdI ₂	340.564		d. 350																														
1246	PdS	138.765		950																														
1247	Pd ₂ S	245.465		800 d.	7.3																													
1248	PdSe	185.900		<960																														
Ag 32	Al 55	As 13	Au 33	B 54	Ba 79	Be 15	Bi 5	C 16	Ca 77	Cl 51	Cd 29	Co 59	Cr 44	Cu 65	Dy 3	Er 67	Eu 64	F 9	Fe 43	Ga 25	Gd 65	Ge 72	Gl 20	H 2	Hf 73	Hg 80	Ho 68	I 5	In 6	Ir 36	K 38	La 58	Li 3	Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1249	$\text{Pd}(\text{NH}_4)_2\text{Cl}_2$	211.678	Tet.		2.5	
1250	$(\text{NH}_4)_2\text{PdCl}_4$	284.610	Tet.		2.17	
1251	$(\text{NH}_4)_2\text{PdCl}_6$	355.526	C.		2.418	
1252	$(\text{NH}_4)_2\text{PdSO}_4\text{Cl}_2 \cdot \text{H}_2\text{O}$	365.268	Trig.			316
1253	$\text{Pd}(\text{CO})\text{Cl}_2$	205.616		197		
1254	$\text{Pd}(\text{CO})_2\text{Cl}_2$	233.616		142		
1255	$2\text{PdCl}_2 \cdot 3\text{CO}$	439.232		132		
1256	PdSi	134.760			7.31 ¹⁸	
1257	$\text{ZnPdCl}_4 \cdot 6\text{H}_2\text{O}$	492.920	H.		2.359	
1258	MnO —Manganosite	70.9300	C.	1650	5.18	180
1259	$\text{MnO} \cdot \text{H}_2\text{O}$ —Pyrochroite	88.9454	Trig.		3.258 ¹³	349
1260	MnO_2 —Polianite, Pyrolusite	86.9300	R.		5.026	
1261	$\text{MnO}_2 \cdot \text{H}_2\text{O}$	104.945	C.			171
1262	Mn_2O_3	157.860	C.		4.50	
1263	$\text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$ —Manganite	175.875	R.		3.258	1058
1264	Mn_2O_3 —Hausmannite	228.790	Tet.		4.700	421
1265	MnF_2	92.9300		856	3.98	
1266	MnF_3	111.930			3.54	
1267	$\text{MnF}_3 \cdot 5\text{HF} \cdot 6\text{H}_2\text{O}$	301.061			1.921	
1268	MnCl_2 —Scacchite	125.846	C.	650	2.977 ²⁴	
1269	$\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$	197.908	M.	58.01	2.01	
1270	$\text{Mn}(\text{ClO}_4)_2 \cdot 8\text{H}_2\text{O}$	397.969			1.99	
1270.1	$\text{MnCl}_2 \cdot 3\text{MnO}_2 \cdot 3\text{H}_2\text{O}$ —Kempite	440.682	R.		2.94	889
1271	MnBr_2	214.762			4.385 ²⁵ fused	
1272	$\text{MnBr}_2 \cdot 4\text{H}_2\text{O}$	285.820	M.	64.3d		
1273	MnS —Alabandite	86.9950	C.	d.	3.99	197
1274	MnS_2 —Hauerite	119.060	C.		3.463	196
1275	MnSO_4	150.995		700	3.25	
1276	$\text{MnSO}_4 \cdot \text{H}_2\text{O}$ —Szczymikite	169.010	M. ?		2.954	742
1277	$\text{MnSO}_4 \cdot 2\text{H}_2\text{O}$	187.026			2.526	
1278	$\text{MnSO}_4 \cdot 3\text{H}_2\text{O}$	205.041			2.356	
1279	$\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$	223.057	M. R.		2.107	
1280	$\text{MnSO}_4 \cdot 5\text{H}_2\text{O}$	241.072	Tri.		2.103	
1281	$\text{Mn}_2\text{S}_2\text{O}_7 \cdot 6\text{H}_2\text{O}$	323.152	Tri.		1.757	
1282	MnSe	134.130	C.		5.59 ¹⁵	
1283	$\text{MnSeO}_4 \cdot 2\text{H}_2\text{O}$	234.161	R.		2.949	
1284	$\text{MnSeO}_4 \cdot 5\text{H}_2\text{O}$	288.207	Tri.		2.334	
1285	Mn_3N_2	302.666			6.63	
1286	$\text{Mn}(\text{NO}_2)_2 \cdot 3\text{H}_2\text{O}$	232.992		34.81		
1287	$\text{Mn}(\text{NO}_2)_2 \cdot 6\text{H}_2\text{O}$	287.038		25.8	1.82	
1288	NH_4MnO_4	136.969	R.		2.208 ^{10.3}	
1289	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{MnSO}_4 \cdot 6\text{H}_2\text{O}$	391.229	M.		1.831	484
1290	$(\text{NH}_4)_2\text{SO}_4 \cdot 2\text{MnSO}_4$	434.133	C.		2.56 ¹⁴	
1291	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{Mn}_2(\text{SO}_4)_3$	530.196			2.40 ¹¹	
1292	$(\text{NH}_4)_2\text{SeO}_4 \cdot \text{MnSeO}_4 \cdot 6\text{H}_2\text{O}$	485.500	M.		2.093	
1293	Mn_2P_2	391.628			4.94	
1294	$\text{Mn}_2\text{P}_2\text{O}_7$	283.908	M.		3.707 ²⁴	897
1295	$3\text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$ —Reddingite	408.884	R.		3.1	842
1296	$3\text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$?—Stewartite	426.898	Tri.		2.94	846
1297	$5\text{MnO} \cdot 2\text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ —Palaite	710.808	M.		3.17	843
1298	$5\text{MnO} \cdot 2\text{P}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$ —Hureaulite	728.823	M.		3.18	835
1299	$3\text{MnO} \cdot \text{As}_2\text{O}_5$ —Armangite	442.710	H. R.		4.23	
1300	$4\text{MnO} \cdot \text{As}_2\text{O}_5 \cdot \text{H}_2\text{O}$ —Sarkinite, Polysarkinite	531.655	M.		4.15	954
1301	$\text{Mn}_2\text{O}_3 \cdot 4\text{MnO} \cdot \text{As}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ —Flinkite	743.562	R.		3.87	959
1302	$6\text{MnO} \cdot \text{As}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$ —Hemafibrite	745.577	R.		3.6	980
1303	$7\text{MnO} \cdot \text{As}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$ —Allactite	798.492	M.		3.84	945
1304	MnSb	176.700			5.6 ¹⁷	
1305	$10\text{MnO} \cdot \text{Sb}_2\text{O}_3$ —Manganostibite	1032.84	M.			989
1306	Mn_3C	176.790			6.89 ¹⁷	
1307	MnCO_3 —Rhodochrosite	114.930	Trig.		3.125	368
1308	$\text{Mn}_2\text{C}_2\text{O}_4$	142.930			2.43 ^{21.7}	
1309	$\text{Mn}(\text{CHO}_2)_2$	144.945			2.205	

Mg Mn Ni N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 78 47 11 22 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1310	Mn(CHO ₃) ₂ ·2H ₂ O.....	180.976	R.		1.953	
1311	Mn(C ₂ H ₃ O ₂) ₂	172.976			1.74	
1312	Mn(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	245.038	M.		1.589	
1313	MnCl ₂ ·2C ₂ H ₅ N·HCl.....	320.405		175		
1314	MnSi.....	82.9900		1280	5.90 ¹⁵	
1315	MnSi ₂	111.050			5.24 ¹⁵	
1316	Mn ₂ Si.....	137.920		1316	6.20 ¹⁵	
1317	MnO ₂ ·SiO ₂	130.990		1273	3.48 ²⁵	63
1318	MnO ₂ ·SiO ₂ —Rhodonite.....	130.990	Tri.	1323	3.72 ²⁵	929
1319	2MnO ₂ ·SiO ₂ —Tephroite.....	201.920	R.	1300	4.043 ²⁵	949
1320	3Mn ₂ O ₃ ·MnO ₂ ·SiO ₂ —Braunite.....	604.570	Tet.		4.78	
1321	8MnO ₂ ·7SiO ₂ ·5H ₂ O—Bementite.....	1077.94	R.		2.90	803
1322	12MnO ₂ ·8SiO ₂ ·7H ₂ O—Ectropite.....	1457.75	M. ?		2.46	1044
1323	MnSiF ₆ ·6H ₂ O.....	305.082	Trig.	d.	1.904 ^{17.5}	206
1324	5MnO ₂ ·SiO ₂ ·As ₂ O ₃ ·H ₂ O—Dixenite.....	630.645	H.		4.2	385
1324.1	12MnO ₂ ·9SiO ₂ ·As ₂ O ₃ ·7H ₂ O—Schallerite.....	1747.73			3.368	344
1325	MnO ₂ ·TiO—Pyrophanite.....	150.830	Trig.	1404	4.54	405
1326	2MnO ₂ ·6PbO·3As ₂ O ₃ ·H ₂ O—Trigonite.....	2188.84	M.		8.28	1004
1327	2Mn ₂ O ₃ ·3PbO·3SiO ₂ —Kentrolite.....	1165.44	R.		6.19	1014
1328	2Mn ₂ O ₃ ·3CuO—Crednerite.....	554.430			5.0	
1329	MnPtCl ₆ ·6H ₂ O.....	571.000	Trig.	d.	2.692	
1330	MnPtCl ₆ ·12H ₂ O.....	679.093	Trig.		2.112	
1331	MnPtBr ₆ ·12H ₂ O.....	945.841	Trig.		2.759	
1332	MnPtI ₆ ·9H ₂ O.....	1173.89	Trig.	d.	3.604	
1333	FeO.....	71.8400		1420		
1334	Fe ₂ O ₃ —Hematite.....	159.680	Trig.	1560 d.	5.12	424
1335	Fe ₂ O ₃ ·H ₂ O—Goethite.....	177.695	R.		4.28	1026
1336	Fe ₂ O ₃ ·H ₂ O—Lepidocrocite.....	177.695	R.		4.09	1013
1337	Fe ₃ O ₄ —Magnetite.....	231.520	C.	1538 d.	5.2	
1338	FeF ₂	93.8400			4.09	
1339	FeF ₃	112.840			3.18	
1340	FeCl ₂ —Lawrencite.....	126.756	H.		2.7	280
1341	FeCl ₂ ·4H ₂ O.....	198.818			1.93	
1342	FeCl ₃ —Molysite.....	162.214	H.	282	2.8	
1343	2FeCl ₃ ·2HCl·4H ₂ O.....	469.421		45.7		
1344	FeBr ₂	215.672			4.636 ²⁵	
1345	FeBr ₂ ·6H ₂ O.....	403.680		27		
1346	FeI ₂	309.704		177		
1347	FeI ₂ ·4H ₂ O.....	381.764			2.87	
1348	FeS—Troilite.....	87.9050	H.	1193	4.8	
1349	FeS ₂ —Marcasite.....	119.970	R.	Tr. 450	4.87	
1350	FeS ₂ —Pyrite.....	119.970	C.		5.0	
1351	Fe ₂ S ₃	207.875			4.3	
1352	Fe ₂ S ₄	295.780			4.55	
1353	Fe ₇ S ₈ —Pyrrhotite.....	647.400	H.	d. >700	4.6	
1354	FeSO ₄ ·H ₂ O—Szomolnokite.....	169.920	M.		3.08	
1355	FeSO ₄ ·5H ₂ O—Siderotilite.....	241.982	Tri.		2.2	642
1356	FeSO ₄ ·7H ₂ O—Melanterite.....	278.012	M.		1.89	471
1357	Fe ₂ O ₃ ·2SO ₃ ·7H ₂ O—Amarantite.....	445.918	Tri.		2.11	762
1358	Fe ₂ O ₃ ·2SO ₃ ·10H ₂ O—Fibroferrite.....	499.964	R.		1.86	255
1359	Fe ₂ O ₃ ·3SO ₃ ·9H ₂ O—Coquimbite.....	562.014	Trig.		2.1	270
1360	Fe ₂ O ₃ ·4SO ₃ ·9H ₂ O—Rhomboclasite.....	642.079	R.			675
1361	FeO·Fe ₂ O ₃ ·4SO ₃ ·24H ₂ O—Bilinite.....	984.150			1.87	530
1362	2Fe ₂ O ₃ ·SO ₃ ·6H ₂ O—Glockerite.....	507.517				958
1363	2Fe ₂ O ₃ ·5SO ₃ ·18H ₂ O—Copiapite.....	1043.96	R.		2.1	654
1364	3Fe ₂ O ₃ ·4SO ₃ ·10H ₂ O—Carphosiderite.....	979.454	Trig.		2.6	371
1365	Fe ₂ O ₃ ·3TeO ₂ ·4H ₂ O—Durdenite.....	662.242	R.			990
1366	Fe ₂ N.....	125.688		d.	6.35	
1367	Fe(NO ₃) ₃ ·6H ₂ O.....	349.956		35		
1368	(NH ₄) ₂ SO ₄ ·FeSO ₄ ·6H ₂ O.....	392.140	M.		1.864	513
1369	(NH ₄) ₂ SO ₄ ·Fe ₂ (SO ₄) ₃ ·24H ₂ O.....	964.387	C.		1.71	102
1370	(NH ₄) ₂ SeO ₄ ·FeSeO ₄ ·6H ₂ O.....	486.410	M.		2.160	612
1371	FeP.....	86.8640			5.2	

Ag Al As Au
32 55 13 33B Ba Be Bi Br
54 79 75 15 5C Ca Cb Cd Ce
16 77 51 29 59Cl Co Cr Cs Cu
4 44 46 85 31Dy Er Eu F Fe
67 69 64 3 43Ga Gd Ge Gl H
25 65 20 75 2Hf Hg Ho I In
73 30 68 6 26Ir K La Li Lu
36 83 58 81 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1372	Fe ₂ P.....	142.704		1290	5.7	
1373	Fe ₂ P ₂	204.752			4.5	
1374	Fe ₂ P.....	198.544		1110	6.74	
1375	Fe ₂ P ₄	291.616			5.04	
1376	Fe(PO ₃) ₃	292.912			3.02	
1377	Fe ₂ O ₃ .P ₂ O ₅ .4H ₂ O—Strengite.....	373.790	R.		2.87	917
1378	3FeO.P ₂ O ₅ .8H ₂ O—Vivianite.....	501.691	M.		2.58	757
1379	2Fe ₂ O ₃ .P ₂ O ₅ .12H ₂ O—Cacoxenite.....	677.593	H.		3.38	285
1380	3Fe ₂ O ₃ .2P ₂ O ₅ .8H ₂ O—Beraunite.....	907.259	M.		2.9	950
1381	7FeO.2P ₂ O ₅ .9H ₂ O—Ludlamite.....	949.115	M.		3.72	873
1382	2Fe ₂ O ₃ .P ₂ O ₅ .2SO ₂ .2H ₂ O—Destinezite.....	657.569	Tri.		2.1	794
1383	2Fe ₂ O ₃ .P ₂ O ₅ .2SO ₂ .2H ₂ O—Diadochite.....	657.569			2.0	142
1384	FeAs.....	130.800		1020	7.83	
1385	FeAs ₂ —Arsenoferrite.....	205.760	C.	990	7.4	
1386	FeAs ₂ —Löllingite.....	205.760	R.		7	
1387	FeAsO ₄ .4H ₂ O—Scorodite.....	266.862	R.		3.2	941
1388	3FeO.As ₂ O ₃ .8H ₂ O—Symplectite.....	589.563	M.		2.96	857
1389	3Fe ₂ O ₃ .2As ₂ O ₃ .13H ₂ O—Pharmacosiderite.....	1109.08	M. ?, C.		3	874
1390	FeS ₂ .FeAs ₂ —Arsenopyrite.....	325.730	R.		6.2	
1391	2FeO.Sb ₂ O ₃ —Triphuyite.....	467.220			5.82	1015
1392	FeS.Sb ₂ S ₃ —Berthierite.....	427.640	R.		4.0	
1393	Fe ₃ C.....	179.520		1837	7.4	
1394	FeCO ₃ .H ₂ O—Siderite.....	133.855	Trig.		3.8	377
1395	FeC ₂ O ₄ .2H ₂ O.....	179.871	R.	d. 160	2.28	
1396	Fe(CO) ₄	167.840		d. 140	1.996 ¹⁸	
1397	Fe(CO) ₅	195.840		— 21	1.1.457	
1398	Fe ₂ (CO) ₉	363.680		d. 100	2.085 ¹⁸	
1399	FeC ₁₀ H ₁₄ O ₈ S ₂ .6H ₂ O—Naphthalene-β-sulfonate.....	578.170				1039
1400	(NH ₄) ₄ Fe(CN) ₆ .2NH ₄ Cl.3H ₂ O.....	445.083	Trig.		1.490	301
1401	Fe ₄ (NO) ₇ S ₃ N(C ₂ H ₅) ₄	659.773			1.883 ¹⁹	
1402	FeSi.....	83.9000			6.1	
1403	FeSi ₂	111.960			5.4	
1404	Fe ₂ Si.....	139.740			7.0	
1405	Fe ₂ Si ₂	223.640			6.7	
1406	FeO.SiO ₂ —Gruenerite.....	131.900	M.	1550	3.5	890
1407	2FeO.SiO ₂ —Fayalite.....	203.740	R.	1255		978
1408	2Fe ₂ O ₃ .2SiO ₂ .3H ₂ O—Iddingsite.....	493.526	R.		2.8	928
1409	FeSiF ₆ .6H ₂ O.....	305.992	Trig.			207
1410	FeO.TiO ₂ —Ilmenite.....	151.740	Trig.		4.75	
1411	Fe ₂ O ₃ .3TiO ₂ —Arizonite.....	399.380	M. ?		4.25	1069
1412	2Fe ₂ O ₃ .3TiO ₂ —Pseudobrookite.....	559.060	R.		4.7	1061
1413	6FeO.Sb ₂ O ₃ .5TiO ₂ —Derbylite.....	1122.08	R.		4.53	420
1414	2Fe ₂ O ₃ .PbO.3SO ₂ .4H ₂ O—Vegasite.....	854.817	H.			555
1415	3Fe ₂ O ₃ .PbO.4SO ₂ .6H ₂ O—Plumbojarosite.....	1130.59	Trig.		3.63	378
1416	3Fe ₂ O ₃ .2PbO.P ₂ O ₅ .2SO ₂ .6H ₂ O—Corkite.....	1335.71	Trig.		4.2	383
1417	5Fe ₂ O ₃ .3PbO.6As ₂ O ₃ —Carminite.....	2847.52			4.1	
1418	FeS.3Sb ₂ S ₃ .4PbS—Jamesonite.....	1967.98	M.		5.7	
1419	3Fe ₂ O ₃ .2PbO.As ₂ O ₃ .2SO ₂ .6H ₂ O—Beudantite.....	1423.58	Trig.		4.1	386
1420	9Fe ₂ O ₃ .4PbO.6As ₂ O ₃ .4SO ₂ .33H ₂ O—Lossenite.....	4622.21	R.			952
1421	2Fe ₂ O ₃ .3PbO.3SiO ₂ —Melanotekite.....	1169.14	R.		5.73	1010
1422	TiFe(SO ₄) ₂ .12H ₂ O.....	668.555	C.		2.38	124
1423	Zn(FeO ₂) ₂	241.060			5.33	
1424	Fe ₂ O ₃ .CuO.....	239.250		1458		
1425	FeS.CuS—Chalcopyrite.....	183.540	Tet.		4.2	
1426	FeS.2Cu ₂ S.CuS—Bornite.....	501.950	C.		5.0	
1427	2FeS.CuS—Cubanite.....	271.445	R.		4.0	
1428	4FeS.Cu ₂ S.2CuS.....	702.095			5.0	
1429	4FeS.3Cu ₂ S.3CuS.....	1116.14			4.85	
1430	3Fe ₂ O ₃ .CuO.2P ₂ O ₅ .8H ₂ O—Chalcosiderite.....	986.829	Tri.		3.1	969
1431	Fe ₂ O ₃ .2CuO.As ₂ O ₃ .2H ₂ O—Chenevixite.....	584.771			3.93	379

70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																															
1432	FeS.Cu ₂ S.SnS ₂ —Stannite.....	429.940	Tet.		4.4																																
1433	Fe ₂ O ₃ .CuO.PbO.2SO ₃ .4H ₂ O—Beaverite..	694.642	H.		4.36	373																															
1434	2Ag ₃ Fe(CN) ₆ .3NH ₃	1122.15			2.45																																
1435	FePtCl ₆ .6H ₂ O.....	571.910			2.7																																
1436	FePtI ₆ .9H ₂ O.....	1174.80			3.45																																
1437	FeO.MnO ₂ —Bixbyite.....	158.770	C.		4.95																																
1438	Fe ₂ O ₃ .MnO—Jacobsite.....	230.610	C.		4.75																																
1439	Fe ₂ O ₃ .9MnO.4P ₂ O ₅ .14H ₂ O—Salmonsite..	1618.46	R.		2.88	848																															
1439.1	9(MnFe)O.8SiO ₂ .MnCl ₂ .7H ₂ O—Friedelite		Trig.		3.1	329																															
1440	CoO.....	74.9700	C.	d. 80o	5.68																																
1441	Co ₂ O ₃	165.940			5.18																																
1442	Co ₃ O ₄	240.970			6.073																																
1443	Co(OH) ₂	92.9854		d.	3.597 ¹⁵																																
1444	CoF ₂	96.9700	M.		4.43																																
1445	CoF ₂ .3H ₂ O.....	151.016			2.583 ²⁵ ₂₅																																
1446	CoF ₂ .5HF.6H ₂ O.....	305.101	Trig.		2.045																																
1447	CoCl ₂	129.886			3.356																																
1448	CoCl ₂ .2H ₂ O.....	165.917			2.477 ²⁵ ₂₅																																
1449	CoCl ₂ .6H ₂ O.....	237.978	M.	86	1.924 ²⁵ ₂₅																																
1450	Co(ClO ₃) ₂ .6H ₂ O.....	333.978		61	1.92																																
1451	Co(ClO ₄) ₂ .6H ₂ O.....	365.978	H.	143		131																															
1452	Co(ClO ₄) ₂ .7H ₂ O.....	383.994			2.075																																
1453	CoBr ₂	218.802			4.909 ²⁵ ₄																																
1454	CoBr ₂ .6H ₂ O.....	326.894		100 d.																																	
1455	CoI ₂	312.834			5.68																																
1456	Co(IO ₃) ₂ .6H ₂ O.....	516.926			3.689 ³¹																																
1457	CoS—Sypoorite.....	91.0350		>1100	5.45																																
1458	Co ₃ S ₄ —Linnaeite.....	305.170	C.		4.9																																
1459	CoSO ₄	155.035			3.710 ²⁵ ₂₅																																
1460	CoSO ₄ .H ₂ O.....	173.050		d.	1.92																																
1461	CoSO ₄ .4H ₂ O.....	227.096			2.368 ²⁵ ₂₅																																
1462	CoSO ₄ .6H ₂ O.....	263.127	M.		2.029 ²⁵ ₂₅																																
1463	CoSO ₄ .7H ₂ O—Bieberite.....	281.143	M. ?		1.948 ²⁵ ₂₅	481																															
1464	CoSe.....	138.170			7.65																																
1465	CoSeO ₄ .5H ₂ O.....	292.247	Tri.	d.	2.512																																
1466	CoSeO ₄ .6H ₂ O.....	310.262	M.		2.32	599																															
1467	CoSeO ₄ .7H ₂ O.....	328.278	M.		2.135																																
1468	Co(NO ₃) ₂ .3H ₂ O.....	237.032		91																																	
1469	Co(NO ₃) ₂ .6H ₂ O.....	291.078	M.	<100	1.883 ²⁵ ₂₅																																
1470	Co(NO ₃) ₂ .3NH ₃	248.087			2.001 ³² ₄																																
1471	[Co(NH ₃) ₄ (NO ₂) ₂]NO ₃	281.118	R.		1.922 ¹⁷																																
1472	Co(NO ₃) ₂ .6NH ₃	285.173			1.473 ²⁵ ₂₅																																
1473	CoF ₂ .6NH ₃	199.157			1.744 ²⁵ ₂₅																																
1474	CoCl ₂ .NH ₃	146.917		ca. 321																																	
1475	CoCl ₂ .2NH ₃ (α).....	163.948		273	2.097 ²⁵ ₂₅																																
1476	CoCl ₂ .2NH ₃ (β).....	163.948			2.073 ²⁵ ₂₅																																
1477	CoCl ₂ .4NH ₃	198.010		d.	1.593 ²⁵ ₂₅																																
1478	CoCl ₂ .5NH ₃	215.042			1.580 ²⁵ ₂₅																																
1479	[Co(NH ₃) ₅ Cl]Cl ₂	250.500	R.		1.819 ²⁵ ₂₅																																
1480	CoCl ₂ .6NH ₃	232.073		d.	1.497 ²⁵ ₂₅																																
1481	CoCl ₃ .6NH ₃	267.531	M.		1.744 ²⁵ ₂₅																																
1482	CoCl ₂ .10NH ₃	300.197			1.71 ²⁵ ₂₅																																
1483	[Co(NH ₃) ₄ (OH ₂)Cl]Cl ₂	251.484	R.		1.847																																
1484	[Co(NH ₃) ₅ (NO ₂)]Cl ₂	261.050	M.		1.698 ¹⁸																																
1485	[Co(NH ₃) ₅ (NO ₂)](NO ₃)Cl.....	287.500	R.		1.800																																
1486	CoBr ₂ .2NH ₃	252.864		26o																																	
1487	[Co(NH ₃) ₅ Br]Br ₂	383.874		d.	2.483 ^{17.8} ₄																																
1488	CoBr ₂ .6NH ₃	320.989			1.955																																
1489	[Co(NH ₃) ₅ Br]Cl ₂	294.958			2.095 ^{16.8} ₅																																
1490	CoI ₂ .2NH ₃	346.896		222																																	
1491	(NH ₄) ₂ SO ₄ .CoSO ₄ .6H ₂ O.....	395.270	M.		1.901	521																															
1492	Co(SO ₄) ₂ .4NH ₃ .2H ₂ O.....	355.255			1.804 ²⁵ ₂₅																																
1493	Co(SO ₄) ₂ .5NH ₃	336.256			1.703 ²⁵ ₂₅																																
Ag 32	Al 55	As 75	Au 197	B 108	Ba 137	Be 9	Bi 209	Br 80	C 12	Ca 40	Cb 94	Cd 112	Ce 140	Cl 35.5	Co 59	Cr 52	Cs 133	Cu 63.5	Dy 163	Er 167	F 19	Fe 56	Ga 70	Gd 157	Ge 73	Gl 75	Hi 204	Hf 178	Hg 201	Ho 164	I 127	In 75	Ir 223	K 39	La 139	Li 7	Lu 175

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1494	$[\text{Co}(\text{NH}_3)_6(\text{SO}_4)]\text{SO}_4 \cdot \text{H}_2\text{O}$	373.294	R.		1.828 ¹⁸	
1495	$[\text{Co}(\text{NH}_3)_6(\text{OH}_2)]_2(\text{SO}_4)_3 \cdot 3\text{H}_2\text{O}$	666.523	Tet.		1.854	
1496	$[\text{Co}(\text{NH}_3)_6]\text{Cl}(\text{SO}_4) \cdot 3\text{H}_2\text{O}$	346.726	R.		1.765	
1497	$(\text{NH}_4)_2\text{SeO}_4 \cdot \text{CoSeO}_4 \cdot 6\text{H}_2\text{O}$	489.540	M.	d.	2.212	623
1498	$\text{Co}(\text{NH}_3)_6\text{Cl}(\text{SeO}_4) \cdot 3\text{H}_2\text{O}$	393.861	R.		1.937	
1499	$\text{Co}(\text{H}_2\text{PO}_2)_2 \cdot 6\text{H}_2\text{O}$	297.141			1.809 ^{18, 5}	
1500	CoAs_2 —Safflorite	208.890		d.	6.97 ⁰	
1501	CoAs_2 —Smaltite	208.890		d.	6.8	
1502	CoAs_2 —Skutterudite	283.850			6.79	
1503	Co_2As_2	342.820		d.	7.35 ⁰	
1504	Co_2As_2	326.830		d.	7.82 ⁰	
1505	$\text{Co}_2(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$ —Erythrite	598.953	M.		2.9	850
1506	CoAsS —Cobaltite	165.995	C.	d.	6.2	
1507	CoCO_3 —Sphero-cobaltite	118.970	Trig.		2.818 ²⁵	375
1508	CoC_2O_4	146.970			2.325 ¹⁹	
1509	$\text{Co}(\text{CO})_4$	170.970		51	1.73 ¹⁸	
1510	$\text{Co}(\text{CHO}_2)_2 \cdot 2\text{H}_2\text{O}$	185.016			2.129 ²²	
1511	$\text{CoC}_2\text{H}_3\text{O}_4 \cdot 2\text{H}_2\text{O}$ —Malonate	197.016			2.279	
1512	$\text{Co}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 4\text{H}_2\text{O}$	249.078	M.		1.718 ⁷	651
1513	$\text{Co}(\text{C}_2\text{H}_3\text{O}_2)_2$ —Acetylacetonate	356.132				
1514	$\text{CoC}_{10}\text{H}_8\text{O}_8\text{S}_2 \cdot 6\text{H}_2\text{O}$ —1, 5-Naphthalene-disulfonate	453.239	M.		1.77	799
1515	$\text{Co}(\text{CO})_2\text{NO}$	172.978		—1.05	1.513 ¹⁴	
1516	$[\text{Co}(\text{NH}_3)_6(\text{C}_2\text{O}_4)]\text{NO}_3 \cdot \text{HNO}_3$	357.149			1.264 ¹⁵	
1517	CoSi	87.0300		1393	6.30	
1518	CoSi_2	115.090		1277	5.3 ⁰	
1519	CoSi_3	143.150		1307		
1520	Co_2Si	146.000		1327	7.11 ⁷	
1521	Co_2SiO_4	210.000			4.63	
1522	$\text{CoSiF}_6 \cdot 6\text{H}_2\text{O}$	309.122	Trig.		2.087	413
1523	$\text{CoSnCl}_6 \cdot 6\text{H}_2\text{O}$	498.510	R. Trig.		2.699	
1524	$\text{CoPtCl}_6 \cdot 6\text{H}_2\text{O}$	575.040	Trig.	d.	2.699	
1525	$\text{CoPtBr}_6 \cdot 12\text{H}_2\text{O}$	949.881	Trig.		2.762	
1526	$\text{CoPtI}_6 \cdot 9\text{H}_2\text{O}$	1177.93	Trig.		3.618	
1527	$\text{CoPtI}_6 \cdot 12\text{H}_2\text{O}$	1231.98	Trig.		3.048	
1528	NiO —Bunsenite	74.6900	C.		7.45	201
1529	Ni_2O_3	165.380			4.83	
1530	$\text{Ni}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	258.085			3.412 ²²	
1531	NiF_2	96.6900			4.63	
1532	$\text{NiF}_2 \cdot 3\text{H}_2\text{O}$	150.736			2.014 ¹⁹	
1533	$\text{NiF}_2 \cdot 5\text{HF} \cdot 6\text{H}_2\text{O}$	304.821	Trig.		2.132	
1534	NiCl_2	129.606			3.544	
1535	$\text{Ni}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$	333.698		80 d.	2.07	
1536	$\text{Ni}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$	365.698	H.	149		132
1537	$\text{Ni}(\text{ClO}_4)_2 \cdot 7\text{H}_2\text{O}$	383.714			2.15	
1538	NiBr_2	218.522			4.64 ¹⁸	
1539	$\text{Ni}(\text{IO}_3)_2$	408.554			5.07	
1540	$\text{Ni}(\text{IO}_3)_2 \cdot 4\text{H}_2\text{O}$	480.616	H.	d. ca. 100		
1541	NiS —Millerite	90.7550	Trig.	797	4.60	
1542	Ni_2S_3	149.445			5.52	
1543	Ni_3S_2	240.200		794 Tr. 545		
1544	Ni_3S_4 —Polydymite	304.330	C.		4.7	
1545	NiSO_4	154.755			3.68	
1546	$\text{NiSO}_4 \cdot \text{H}_2\text{O}$	172.770			1.98	
1547	$\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$	262.847	Tet. M.	Tr. 53.3	2.07	246
1548	$\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ —Morenosite	280.863	R.		1.948	501
1549	$\text{NiS}_2\text{O}_6 \cdot 6\text{H}_2\text{O}$	326.912	Tri.	d.	1.908	
1550	NiSe	137.890			8.46	
1551	$\text{NiSeO}_4 \cdot 6\text{H}_2\text{O}$	309.982	Tet.		2.31	262
1552	$\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	290.798	M.	56.7	2.05	
1553	$\text{NH}_4\text{Cl} \cdot \text{NiCl}_2 \cdot 6\text{H}_2\text{O}$	291.195	M.		1.645	
1554	$\text{Ni}(\text{ClO}_4)_2 \cdot 6\text{NH}_3$	327.793		180	1.52	

78 79 80 81				Na Nb Nd Ni O				Os P Pb Pd				Pr Pt Ra Rb				Rh Ru S Se				Sb Sc Se Si Sn				Sr Ta Tb Te Th				Ti Tl Tm U V				W Y Yb Zn Zr			
82 83 84 85				86 87 88 89				90 91 92 93				94 95 96 97				98 99 100 101				102 103 104 105				106 107 108 109				110 111 112 113				114 115 116 117			

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																																																																
1555	Ni(BrO ₃) ₂ ·6NH ₃	416.709		exp. 195	1.99																																																																	
1556	Ni(IO ₃) ₂ ·5NH ₃	493.710			2.97																																																																	
1557	(NH ₄) ₂ Ni(SO ₄) ₂ ·6H ₂ O.....	394.990	M.		1.923	539																																																																
1558	(NH ₄) ₂ Ni(SeO ₄) ₂ ·6H ₂ O.....	489.260	M.	d.	2.22	643																																																																
1559	NiP ₂	120.738			4.62 ¹⁸																																																																	
1560	NiP ₃	151.762			4.19 ¹⁸																																																																	
1561	Ni ₂ P.....	148.404		1112	6.3 ¹⁵																																																																	
1562	Ni ₂ P ₂	238.118			5.99																																																																	
1563	Ni(H ₂ PO ₃) ₂ ·6H ₂ O.....	296.861		d.	1.824																																																																	
1564	NiAs—Nicolite.....	133.650	H.	968	7.57 ⁹																																																																	
1565	NiAs ₂ —Rammelsbergite.....	208.610	R.		7.1																																																																	
1566	Ni ₂ As ₂ —Maucherite.....	325.990	Tet.		7.86 ⁹																																																																	
1567	Ni ₂ As ₂	443.370		998 Tr. 970																																																																		
1568	Ni ₂ (AsO ₄) ₂	453.990			4.982																																																																	
1569	3NiO·As ₂ O ₃ ·8H ₂ O—Annabergite.....	598.113	M.		3.0	845																																																																
1570	NiAsS—Gersdorffite.....	165.715			6.3																																																																	
1571	NiSb—Breithauptite.....	180.460	H.	1158	7.70 ⁹																																																																	
1572	Ni ₂ Sb ₂	536.990		1170																																																																		
1573	NiSbS—Ullmannite.....	212.525	C.		6.6																																																																	
1574	NiC ₂ O ₄	146.690			2.235																																																																	
1575	Ni(CO) ₄	170.690		—25	1.1.310	136, 143																																																																
1576	3NiO·CO ₂ ·H ₂ O—Zaratite.....	286.085			2.6																																																																	
1577	Ni(CHO ₂) ₂ ·2H ₂ O.....	184.736			2.154																																																																	
1578	Ni(C ₂ H ₃ O ₂) ₂	176.736			1.798																																																																	
1579	Ni(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	248.798			1.744 ^{18,7}																																																																	
1580	NiC ₁₀ H ₈ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene disulfonate.....	452.959	M.		1.79	808																																																																
1581	Ni ₂ Si.....	145.440		1309	7.2 ¹⁷																																																																	
1582	2NiO ₂ ·3SiO ₂ ·2H ₂ O—Connarite.....	397.590	H.		2.5	292																																																																
1583	NiSiF ₆ ·6H ₂ O.....	308.842	Trig.	d.	2.134	210																																																																
1584	NiPdCl ₆ ·6H ₂ O.....	486.230	H.		2.353																																																																	
1585	3NiO·6CuO·2As ₂ O ₃ ·SO ₃ ·7H ₂ O—Lindackerite.....	1367.50	M. ?		2.25	851																																																																
1586	NiPtCl ₆ ·6H ₂ O.....	574.760	Trig.		2.798																																																																	
1587	NiPtBr ₆ ·6H ₂ O.....	841.508	Trig.		3.715																																																																	
1589	CrO ₂	100.010	R.	190 d.	2.7																																																																	
1590	Cr ₂ O ₃	152.020	H.	1900	5.21																																																																	
1591	Cr ₂ O ₃ ·3H ₂ O.....	310.086			2.90																																																																	
1592	Cr ₂ O ₃	404.050			4																																																																	
1593	CrF ₃	90.0100		1100	4.11																																																																	
1594	CrF ₃	109.010	R.	>1000	3.8																																																																	
1595	CrCl ₂	122.926			2.75																																																																	
1596	CrCl ₃	158.384			2.7																																																																	
1597	CrO ₂ Cl ₂	154.926		— 96.5	1.1.836																																																																	
1598	(CrO ₂) ₂ Cl ₆	632.798			2.5																																																																	
1599	CrS.....	84.0750			4.1																																																																	
1600	Cr ₂ S ₃	200.215			3.7																																																																	
1601	Cr ₂ (SO ₄) ₃	344.215			2.2																																																																	
1602	Cr ₂ (SO ₄) ₃	392.215			3.0																																																																	
1603	Cr ₂ (SO ₄) ₃ ·17H ₂ O.....	698.476			1.7																																																																	
1604	H ₂ CrSO ₇	198.090		190 d.																																																																		
1605	H ₂ CrSeO ₇	245.225		200																																																																		
1606	(NH ₄) ₂ CrO ₄	152.088	M.		1.8																																																																	
1607	CrO ₄ ·3NH ₃	167.103	R.		1.96																																																																	
1608	(NH ₄) ₂ Cr ₂ O ₇	252.098	M.		2.15																																																																	
1609	(NH ₄) ₂ Cr ₂ O ₇	352.108	R.		2.33																																																																	
1610	(NH ₄) ₂ Cr ₂ O ₇	452.117		170	2.34																																																																	
1611	NH ₄ IO ₃ ·CrO ₃	292.981	R.		3.5																																																																	
1612	(NH ₄) ₂ CrSO ₇	232.153		160																																																																		
1613	Cr ₂ (SO ₄) ₃ ·(NH ₄) ₂ SO ₄ ·24H ₂ O.....	956.727	C.	100 d.	1.72	101																																																																
1614	CrP.....	83.0340			5.7																																																																	
1615	Cr(PO ₃) ₃	289.082			2.97																																																																	
Ag 23	Al 13	As 33	Au 79	B 8	Ba 56	Be 4	Bi 83	Br 35	C 12	Ca 20	Cb 21	Cd 48	Co 27	Cs 55	Cr 24	Dy 67	Er 69	Ea 70	F 9	Fe 26	Ga 31	Gd 64	Ge 32	Gl 33	H 1	Hf 72	Hg 80	Ho 67	I 53	In 51	Ir 76	K 19	La 57	Li 3	Lu 71	Mn 25	N 7	Nb 41	Ne 10	Ni 28	Os 76	P 15	Pb 82	Pr 59	Rb 37	Re 75	S 16	Sb 51	Se 34	Si 14	Sn 50	Sm 60	So 36	Sp 37	St 38	Sr 38	Ta 73	Tb 61	Tl 81	Tm 69	Tn 39	U 92	V 23	Va 43	W 74	Xe 54	Y 39	Yb 70	Zn 30	Zr 40

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1616	$\text{Cr}_4(\text{P}_2\text{O}_7)_3$	730.184	M.		3.2	
1617	Cr_2As_2	328.900			6.2	
1618	$4\text{CrO}_3 \cdot \text{As}_2\text{O}_5 \cdot 2(\text{NH}_4)_2\text{O} \cdot \text{H}_2\text{O}$	752.131		d. 175	1.83	
1619	Cr_3C_3	180.030		1890	6.68	
1620	Cr_4C	220.040			6.75	
1621	Cr_3C_3	284.050		1665	6.92	
1622	$\text{CrC}_2\text{O}_4 \cdot \text{H}_2\text{O}$	158.025			2.46	
1623	$\text{Cr}(d\text{-C}_4\text{H}_4\text{O}_6)$	200.041			2.33 ¹⁵	
1624	$\text{Cr}[\text{CH}(\text{COCH}_3)_2]_3$ —Acetylacetonate	349.172		214		
1625	$[\text{Cr}(\text{CON}_2\text{H}_4)_4]\text{Cl}_3 \cdot 3\text{H}_2\text{O}$	572.711		150		
1626	$[\text{Cr}(\text{CON}_2\text{H}_4)_4](\text{CN})_3 \cdot 5.5\text{H}_2\text{O}$	589.400		75		
1627	$[\text{Cr}(\text{CON}_2\text{H}_4)_4](\text{SCN})_3$	586.510		90 d.		
1628	CrSi_2	108.130			4.4	
1629	Cr_2Si	184.090			6.52	
1630	Cr_3Si_2	212.150			5.5	
1631	PbCrO_4 —Crocoitite	323.210	M.	844	6.3	1060
1632	$3\text{PbO} \cdot 2\text{CrO}_3$ —Phoenicochroite	869.620			5.75	
1633	$\text{TiCr}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$	664.725	C.		2.38	122
1634	ZnCr_2O_4	233.400			5.3	
1635	$(\text{NH}_4)_3\text{Cr}_2\text{O}_7 \cdot \text{HgCl}_2$	523.624	M.		3.11	
1636	Ag_2CrO_4	331.770			5.625	
1637	$\text{Ag}_2\text{Cr}_2\text{O}_7$	431.780			4.770	
1638	$\text{MnO} \cdot \text{Cr}_2\text{O}_3$	222.950			4.87	
1639	FeCr_2O_4 —Chromite	223.860	C.		4.5	181
1640	$\text{NiCr}_2\text{O}_4 \cdot \text{Cl}_2 \cdot 9\text{H}_2\text{O}$	491.765		47		
1641	MoO_2	128.000	Tet.		4.516 ^{19.5}	
1642	MoO_3	144.000	R.	795	4.50 ^{19.5}	
1643	$\text{Mo}_3\text{O}_{14} \cdot 6\text{H}_2\text{O}$	812.092			3.6 ¹⁸	
1644	H_2MoO_4	162.015	H.	d. 115		
1645	H_4MoO_6	180.031	M. Tri. ?		3.124 ¹⁵	
1646	MoF_6	210.000		17		
1647	MoO_2F_2	166.000			3.494	
1648	MoOF_4	188.000		98	3.001	
1649	MoCl_5	273.290		194		
1650	MoI_3	349.864			4.3	
1651	MoS_2 —Molybdenite	160.130	H.	1185	4.8	
1652	Mo_2S_3	288.195			5.9 ¹⁵	
1653	$(\text{NH}_4)_2\text{MoO}_4$	196.078	M.		2.270	
1654	$18\text{MoO}_3 \cdot 14\text{NH}_3 \cdot 3\text{H}_2\text{O}_3 \cdot 18\text{H}_2\text{O}$	3256.76	M.		2.975	
1655	Mo_2P_2	254.048			6.17	
1656	$\text{Mo}(\text{PO}_3)_3$	333.072			3.28 ⁹	
1658	$\text{MoCl}_5 \cdot \text{POCl}_3$	426.688		127		
1659	$18\text{MoO}_3 \cdot \text{As}_2\text{O}_5 \cdot 28\text{H}_2\text{O}$	3326.35	Tri.		3.088	
1660	$18\text{MoO}_3 \cdot \text{As}_2\text{O}_5 \cdot 38\text{H}_2\text{O}$	3506.51	Tri.	d.	2.822	
1661	$\text{Bi}_2\text{O}_3 \cdot \text{MoO}_3$ —Koechlinite	610.000	R.			1065
1662	MoC	108.000		2570	8.40	
1663	Mo_2C	204.000		2380	8.9	
1664	$\text{Mo}(\text{CO})_6$	264.000			1.95	
1665	$3\text{C}_2\text{H}_4(\text{NH}_2)_2 \cdot \text{HSCN} \cdot \text{Mo}(\text{OH})(\text{SCN})_3$	462.447		128 d.		
1666	MoSi_2	152.120			6.1	
1667	$\text{TiO}_2 \cdot 12\text{MoO}_3 \cdot 22\text{H}_2\text{O}$	2204.24	Tet.	60		
1668	PbMoO_4 —Wulfenite	367.200	Tet.	1068	6.7	419
1669	$2\text{PbO} \cdot \text{MoO}_3$	590.400		951		
1670	$\text{Fe}_2\text{O}_3 \cdot 3\text{MoO}_3 \cdot 7.5\text{H}_2\text{O}$ —Molybdate	774.796	R.		4.5	919, 936, 953
1671	$\text{WO}_3 \cdot \text{H}_2\text{O}$ —Tungstite	250.015	R.	1473	5.5 ?	1018
1672	WF_6	298.000		2.5		
1673	WOF_4	276.000		110		
1674	WCl_5	361.290		248		
1675	WCl_6	396.748		275		
1676	WO_2Cl_2	286.916				
1677	WOCl_4	341.832		211		
1678	WBr_6	583.580		276		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 76 42 47 11 23 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1679	WOBr ₄	519.664		277		
1680	WCl ₆ .3WBr ₄	2387.24		232		
1681	WI ₂	437.864			6.9 ¹⁸	
1682	WI ₄	691.728			5.2 ¹⁸	
1683	WS ₂	248.130			7.5 ¹⁰	
1684	WP.....	215.024			8.5	
1685	WP ₂	246.048			5.8	
1686	W ₄ P ₃	798.048			5.2 ₁	
1687	24WO ₃ .P ₂ O ₅ .45H ₂ O.....	6520.74	C.		4.68	
1688	WAs ₂	333.920			6.9 ¹⁸	
1689	WC.....	196.000		2777	15.7 ¹⁸	
1690	W ₂ C.....	380.000		2877	16.06 ¹⁸	
1691	W ₂ C.....	564.000		>2700		
1692	WSi ₂	240.120			9.3 ⁰	
1693	W ₂ Si ₂	452.180			10.9	
1694	PbO.WO ₃ —Raspite.....	455.200	M.	1123		1023
1695	PbO.WO ₃ —Stolzite.....	455.200	Tet.		8.23	401
1696	CuO.WO ₃ —Cuprotungstite.....	311.570	Tet.			1007
1697	MnO.WO ₃ —Hübnerite.....	302.930	M.		7.2	1017
1698	FeO.WO ₃ —Ferberite.....	303.845	Tet.		6.64	1062
1699	Fe ₂ O ₃ .WO ₃ .6H ₂ O—Ferritungstite.....	499.772	H.			364
1700	NiO.WO ₃	306.690	R.		6.88 ^{20,5}	
1701	3Cr ₂ C ₃ .W ₂ C.....	920.090			8.4 ²²	
1702	UO ₂ —Uraninite.....	270.170	R.		10.5	
1703	UO ₃	286.170			5.92	
1704	UO ₄ .2H ₂ O.....	338.201		d. 115		
1705	U ₂ O ₅ —Pitchblende.....	842.510			7.31	
1706	UF ₆	352.170	M.		4.68	
1707	(UO ₂)(ClO ₄) ₂ .4H ₂ O.....	541.148		110 d.		
1708	(UO ₂)(ClO ₄) ₂ .6H ₂ O.....	577.178		90		
1709	UBr ₄	557.834			4.84	
1710	UI ₄	745.898		500	5.6	
1711	UO ₂ (IO ₃) ₂	620.034	R.	d. 250	5.2	
1712	UO ₂ (IO ₃) ₂ .H ₂ O.....	638.049			5.05	
1713	UO ₂ SO ₄ .3H ₂ O.....	420.281		d. 100	3.28	
1714	UO ₂ NO ₃ .6H ₂ O.....	440.270	R.	59	2.742	
1715	UO ₂ (NO ₃) ₂ .3H ₂ O.....	448.232		120		
1716	UO ₂ (NO ₃) ₂ .6H ₂ O.....	502.278	R.	d. 100	2.81	525
1717	(NH ₄) ₂ (UO ₂)(NO ₃) ₄ .2H ₂ O.....	590.310			2.78	
1718	(NH ₄) ₂ (UO ₂)(SO ₄) ₂ .2H ₂ O.....	534.408			3.01	
1719	UO ₂ .2P ₂ O ₅	554.266	R.		3.9	
1720	3UO ₂ .P ₂ O ₅ .6H ₂ O—Phosphuranylite.....	1060.65	C.			906
1721	3UO ₂ .As ₂ O ₅ .12H ₂ O—Troegerite.....	1304.61	M.		3.3	802
1722	Bi ₂ O ₃ .2UO ₂ .3H ₂ O—Uranospherite.....	1060.39	R.		6.36	993
1723	5Bi ₂ O ₃ .3UO ₂ .2As ₂ O ₅ .12H ₂ O—Walpurgite.....	3816.53	Tri.		5.76	997
1724	UC ₃	262.170		2200	11.3 ¹⁸	
1725	U ₂ C ₃	512.340		2400	11.28	
1726	UO ₂ .CO ₂ —Rutherfordine.....	330.170	Tet.		5.6	935
1727	UO ₂ C ₂ O ₄	358.170			2.98	
1728	UO ₂ (CHO ₂) ₂ .H ₂ O.....	378.201		d. 110	3.69 ¹⁸	
1729	UO ₂ (C ₂ H ₃ O ₂) ₂ .2H ₂ O.....	424.247	R.	d. 275	2.89 ¹⁸	
1730	(NH ₄) ₂ (UO ₂)(CO ₃) ₂ .2H ₂ O.....	558.356			2.77	
1731	UO ₂ (C ₂ H ₃ O ₂) ₂ .NH ₄ C ₂ H ₃ O ₂	465.278	Tet.			223
1732	USi ₂	294.290			8.0	
1733	12U ₂ O ₇ .58SiO ₂ .14H ₂ O—Soddite.....	6844.60	R.		4.627	
1734	U ₂ Pb ₂ O ₁₇ .4H ₂ O—Curite.....	1949.31			7.19	
1735	8UO ₂ .4PbO.3P ₂ O ₅ .12H ₂ O—Dewindtite.....	3824.49			4.8	
1736	UPbSiO ₆ .1.33H ₂ O—Kasolite.....	593.450	M.		5.96	
1737	Cu(UO ₂) ₂ P ₂ O ₅ .8H ₂ O—Metatorbernite I.....	938.081	Tet.		3.5	303
1738	CuO.2UO ₂ .P ₂ O ₅ .8H ₂ O—Torbernite.....	938.081	Tet.		3.5	737
1739	CuO.2UO ₂ .As ₂ O ₅ .8H ₂ O—Zeunerite.....	993.953	Tet.		3.2	317
1740	VO.....	66.9600			5.758 ¹⁴	
1741	VO ₂	82.9600		>1755	4.399	

Ag Al As Au
23 55 13 33B Ba Be Bi Br
54 79 75 15 5C Ca Cb Cd Ce
16 77 51 29 59Cl Co Cr Cs Cu
4 44 46 85 31Dy Er Eu F Fe
67 69 64 3 43Ga Gd Ge Gl H
25 65 20 75 2Hf Hg Ho I In
73 30 68 6 26Ir K La Li Lu
36 38 58 31 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1742	V ₂ O ₅	133.920			3.64	
1743	V ₂ O ₅	149.920		1970	4.87 ¹⁸	
1744	V ₂ O ₅	181.920		800	3.357	
1745	VF ₃	107.960	R.		3.363 ¹⁹	
1746	VF ₃	126.960		d. 325	2.975 ²²	
1747	VF ₃	145.960			2.177 ¹⁹	
1748	VOF ₂	104.960		d.	3.396 ¹⁹	
1749	VOF ₂	123.960		300	2.459	
1750	VCl ₃	121.876	II.		3.23 ¹⁹	
1751	VCl ₃	157.334			3.00 ¹⁹	
1752	VCl ₃	192.792		-109	1.1.816 ²⁰	
1753	VOCl ₂	102.418			2.824	
1754	VOCl ₂	137.876			2.88 ¹⁹	
1755	VOCl ₂	173.334		< -15	1.1.829	
1756	V ₂ O ₅ Cl.....	201.378			3.64	
1757	VOBr ₃	146.876		d. 480	4.00 ¹⁹	
1758	VOBr ₃	306.708			2.933 ^{14,5}	
1759	V ₂ S ₃	166.050			4.200	
1760	V ₂ S ₃	198.115			4.7 ²¹	
1761	V ₂ S ₃	262.245			3.000	
1762	V ₂ O ₅ ·3SO ₃ ·16H ₂ O—Minasragrite.....	694.361	M. Tri.			619
1763	VN.....	64.9680		2050	5.630	
1764	(NH ₄) ₃ VS ₄	233.336			1.620	
1765	(NH ₄) ₃ V ₂ S ₆ O.....	382.465			1.716	
1766	Bi ₂ O ₃ ·V ₂ O ₅ —Pucherite.....	647.920	R.		6.25 ^{24,5}	1064
1767	VC.....	62.9600		2830	5.4	
1768	V ₄ C ₃	239.840		2750 ^{mm}		
1769	(NH ₄) ₂ VO(CNS) ₄ ·5H ₂ O.....	425.407	R.	58		
1770	VS ₂	107.080			4.42	
1771	V ₂ Si.....	129.980			5.48 ¹⁷	
1772	PbO·V ₂ O ₅	405.120		849		
1773	2PbO·V ₂ O ₅	628.320		722		
1774	3PbO·V ₂ O ₅	851.520		952		
1775	8PbO·V ₂ O ₅	1967.52		794		
1776	9PbO·3V ₂ O ₅ ·PbCl ₂ —Vanadinite.....	2832.68	H.		6.863	403
1777	TiVO ₃	303.360		424		
1778	Ti ₂ VO ₄	728.160		566		
1779	Ti ₄ V ₂ O ₇	315.200		454		
1780	Ti ₄ V ₄ O ₁₈	1638.24			8.59 ^{17,5}	
1781	4(PbZn)O·V ₂ O ₅ ·H ₂ O—Descloisite.....		R.		6.0	1021
1782	Cd ₁₀ V ₆ Cl ₂ O ₂₄	1884.78	H.		5.264 ¹⁵	
1783	Cd ₁₀ V ₆ Br ₂ O ₂₄	1973.69	H.		5.456 ¹⁵	
1784	2PbO·2CuO·V ₂ O ₅ ·H ₂ O—Cuprodescloisite.....	805.475	R.		6.1	1020
1785	Ag ₄ V ₂ O ₇	645.440		383		
1786	5(NH ₄) ₂ O·P ₂ O ₅ ·3V ₂ O ₅ ·15MoO ₃ ·39H ₂ O.....	3810.80			2.410	
1787	6(NH ₄) ₂ O·P ₂ O ₅ ·6V ₂ O ₅ ·12MoO ₃ ·41H ₂ O.....	4012.67			2.411	
1788	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·9MoO ₃ ·20H ₂ O.....	2054.52			2.802 ¹⁸	
1789	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·10MoO ₃ ·21H ₂ O.....	2216.54			2.804 ¹⁹	
1790	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·11MoO ₃ ·27H ₂ O.....	2468.63	M. ?		2.807	
1791	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·15MoO ₃ ·24H ₂ O.....	2990.58			2.816	
1792	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·9WO ₃ ·24H ₂ O.....	2918.58			3.40	
1793	3(NH ₄) ₂ O·SiO ₂ ·V ₂ O ₅ ·10WO ₃ ·21H ₂ O.....	3096.53			3.43	
1794	2UO ₃ ·3V ₂ O ₅ ·15H ₂ O—Uvanite.....	1388.33	R.			979
1795	Cb ₂ O ₃	266.200		1520	4.60 ^{41,2}	
1796	CbF ₃	188.100		75.5	3.29	
1797	CbCl ₃	270.390		194	2.75	
1798	CbOCl ₃	215.474				
1799	CbC.....	105.100				
1800	Cb ₂ FeO ₆ —Ferroxiobite.....	338.040	R.		6.26	1063
1801	Ta ₂ O ₅	443.000	R.	1470 d.	8.735 ^{41,2}	
1802	TaF ₅	276.500		96.8	4.74	
1803	TaCl ₅	358.790		221	3.68 ²⁷	
1804	TaBr ₅	581.080		240		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Re Rh Ru S Se Sb Sc So Se Si Sn Br Tb Td Te Th Ti Tl Tm U V W Y Yb Zn Zr
76 43 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 62 66 10 24 19 27 70 49 80 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1805	TaC.....	193.500				
1806	TaSi ₃	237.620			8.83°	
1807	Ta ₂ O ₅ .MnO—Manganotantalate.....	513.930	R.		7.03	1019
1808	B ₂ O ₃	69.6400			l. 1.85 glass	26
1809	B ₂ O ₃ .3H ₂ O—Sassolite.....	123.686	Tri.	d.	1.49	448
1810	B ₂ H ₄	27.6862		—169		
1811	B ₄ H ₁₀	53.3570		—112		
1812	B ₁₀ H ₁₄	122.308		99.5	0.94	
1813	BF ₃	67.8200		—127		
1814	BCl ₃	117.194		—107	l. 1.434°	
1815	BBr ₃	250.568		—45	l. 2.60	
1816	B ₂ HBr.....	102.564		—104		
1817	BI ₃	391.616		43	l. 3.35°	
1818	B ₂ S ₃	117.835		310	1.55	
1819	BN ₃	38.8360				
1820	NH ₄ BF ₄	104.859			1.851 ¹⁷	
1821	CB ₄	76.9200		235°	2.6	
1822	B(CH ₃) ₃	55.8893		56		
1823	B(C ₂ H ₅) ₃	97.9355			l. 0.696 ²³	
1824	B(OCH ₃) ₃	103.889			l. 0.915	
1825	B(OC ₂ H ₅) ₃	145.936			l. 0.864 ^{24.5}	11
1826	B(OC ₃ H ₇) ₃	187.982			l. 0.867 ¹⁶	
1827	B(OC ₄ H ₉) ₃ —Isobutyl.....	230.028			l. 0.864°	14
1828	B(OC ₅ H ₁₁) ₃ —Isoamyl.....	272.074			l. 0.872°	17
1829	SiB ₃	60.5200			2.52	
1830	SiB ₄	92.9800			2.47	
1831	Zr ₃ B ₄	316.280			3.7	
1833	ThB ₄	275.430			7.5	
1834	ThB ₆	297.070			6.4	
1835	TiBO ₂	247.220		472		
1836	Ti ₂ BO ₃	672.020		370 d.		
1837	Ti ₄ B ₂ O ₉	919.240		434		
1838	B ₂ O ₃ .CdO.....	198.050		875		
1839	B ₂ O ₃ .CuO.....	149.210		d. 875	3.86	
1840	MnB ₂	76.5700			6.9	
1841	Mn ₃ B ₄ O ₉	352.070	Tri.		3.61	923
1842	FeB.....	66.6600			7.15	
1843	Fe ₂ B.....	122.500			7.4	
1844	FeB ₂	77.4800			5.0	
1845	Fe ₂ B ₃	165.780		134°		
1846	Fe ₃ B ₂	300.840		1351		
1847	CoB.....	69.7900			7.25	
1848	Co ₂ B.....	112.740			7.9	
1849	NiB.....	69.5100			7.4	
1850	Ni ₂ B.....	128.200		1225	8.0	
1851	Ni ₃ B ₂	197.710		116°		
1852	CrB.....	62.8300			5.5	
1853	Cr ₂ B ₂	177.670			6.7 ¹⁵	
1854	Mo ₂ B ₄	331.280			7	
1855	WB ₃	205.640			10.8	
1857	B ₂ O ₃ .9WO ₃ .2NiO.18H ₂ O.....	2631.30	M.	80	l. 3.6°	
1858	Al ₂ O ₃ —Corundum.....	101.920	Trig.	205°	4.00	359
1859	Al ₂ O ₃ .H ₂ O—Diaspore.....	119.935	R.	d. 360	3.413	911
1860	Al ₂ O ₃ .3H ₂ O—Gibbsite.....	155.966	M.	d. 200	2.423	692
1861	Al(OH) ₃	77.9831	M.			632
1862	AlF ₃	83.9600	Tri.	104°	3.07	
1863	AlF ₃ .H ₂ O—Fluellite.....	101.975	R.		2.17	507
1864	AlCl ₃	133.334	H.	194	2.44 ²⁵ l. 1.31 ²⁰⁰	
1865	AlBr ₃	266.708	Trig.	97.5	3.01 ²⁶ l. 2.64 ¹⁰⁰	
1866	AlBr ₃ .15H ₂ O.....	536.939		— 7.5 m		
1867	Al(BrO ₃) ₃ .9H ₂ O.....	572.847		62.3		

Ag 23
Al 13
As 33B 54
Ba 70
Be 15
Bi 5C 16
Ca 77
Ch 51
Cd 29
Co 59Cl 4
Co 44
Cr 46
Cu 51Dy 67
Er 69
Eu 64
F 3
Fe 43Ga 25
Gd 65
Ge 30
Gf 75
H 2Hf 73
Hg 30
Ho 68
I 6
In 26Ir 36
K 83
La 58
Li 81
Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1868	AlBrCl ₂	177.792		143		
1869	AlI ₃	407.756		191	3.98	
1870	Al ₂ S ₃	150.115	H.	110o	1.3.20 ²⁰⁰	
1871	Al ₂ O ₃ .SO ₃ .9H ₂ O—Aluminite.....	344.124	M.	d.	2.02	453
1872	Al ₂ O ₃ .2SO ₃ —Alumian.....	262.050	Trig.		1.705 ^o	286
1873	Al ₂ O ₃ .3SO ₃	342.115		d. 77o	2.71	
1874	Al ₂ O ₃ .3SO ₃ .18H ₂ O—Alunogenite.....	630.361	M.		1.691 ¹⁷	468
1875	2Al ₂ O ₃ .SO ₃ .10H ₂ O—Felseobanyite.....	464.059	R.		2.33	587
1876	2Al ₂ O ₃ .SO ₃ .15H ₂ O—Paraluminite.....	554.136				462
1877	AlN.....	40.9680	R.	215o		
1878	Al(NO ₃) ₃ .9H ₂ O.....	375.123	R.	73		
1879	AlCl ₃ .NH ₄ Cl.....	186.831		304		
1880	AlCl ₃ .3NH ₃	184.427		280 d.		
1881	Al ₂ (SO ₄) ₃ .(NH ₄) ₂ SO ₄	474.258			2.039	
1882	Al ₂ O ₃ .(NH ₄) ₂ O.4SO ₃ .24H ₂ O—Tschermigite.....	906.628	C.	93.5	1.64	81
1883	AlPO ₄	121.984	H.		2.59	
1884	Al ₂ O ₃ .P ₂ O ₅ .4H ₂ O—Metavariscite.....	316.030	R.	>150o	2.54	680
1885	Al ₂ O ₃ .P ₂ O ₅ .6H ₂ O—Lucinite.....	352.060	R.		2.566	724
1886	Al ₂ O ₃ .P ₂ O ₅ .6H ₂ O—Zepharovichite.....	352.060		>150o	2.37	664
1887	Al ₂ O ₃ .3P ₂ O ₅	528.064			2.779	
1888	2Al ₂ O ₃ .P ₂ O ₅ .3H ₂ O—Augelite.....	399.934	M.	d.	2.77	712
1889	5Al ₂ O ₃ .2P ₂ O ₅ .9H ₂ O—Spherite.....	955.835	R.	d.	2.536	711
1890	Al(AsCl) ₃	358.214			2.85 ²²	
1891	Al ₂ C ₃	143.840			2.36	
1892	Al ₂ O ₃ .C ₁₂ O ₆ .18H ₂ O—Mellite.....	714.197	Tet.		1.64	260
1893	Al(CH ₃) ₃	72.0293				19
1894	Al(C ₂ H ₅) ₃	114.076				29
1895	Al(C ₂ H ₃ O ₂) ₃ —Acetylacetonate.....	324.122		194		
1896	Al(OC ₂ H ₅) ₃	306.076		ca. 265	1.23	
1897	NH ₄ (CH ₃)Al(SO ₄) ₂ .12H ₂ O.....	467.329	C.		1.568	75
1898	Al ₂ O ₃ .SiO ₂ —Andalusite.....	161.980	R.	d.	3.2	815
1899	Al ₂ O ₃ .SiO ₂ —Cyanite.....	161.980	Tri.	d.	3.6	907
1900	Al ₂ O ₃ .SiO ₂ —Sillimanite.....	161.980		d. <155o	3.23	819
1901	Al ₂ O ₃ .2SiO ₂ .2H ₂ O—Kaolinite.....	258.071	M.		2.6	690
1902	Al ₂ O ₃ .2SiO ₂ .4H ₂ O—Newtonite.....	294.102	Tet.		2.37	274
1903	Al ₂ O ₃ .4SiO ₂ .H ₂ O—Pyrophyllite.....	360.175	R.		2.85	727
1904	3Al ₂ O ₃ .2SiO ₂ —Mullite.....	425.880	R.	181o d.	3.15 ₆	
1905	2(AlF)O.SiO ₂ —Topas.....		R.		3.58	784
1906	Al ₂ Ti ₂	176.680	Tet.		3.348	
1907	3Al ₂ O ₃ .2PbO.2P ₂ O ₅ .7H ₂ O—Plumbogummite.....	1162.36	H.	d.	4.014	325
1908	3Al ₂ O ₃ .2PbO.2SO ₃ .P ₂ O ₅ .6H ₂ O—Hinsdalite.....	1162.43	H.		3.65	865
1909	2Al(OH) ₃ .Pb(HCO ₃) ₂ —Dundasite.....	485.182			3.25	
1910	Al ₂ (SO ₄) ₃ .Ti ₂ SO ₄ .24H ₂ O.....	1279.35	C.	91	2.320	107
1911	Al ₂ O ₃ .ZnO—Automolite (Gahnite).....	183.300	C.		4.58	161
1912	3Al ₂ O ₃ .6ZnO.2SO ₃ .18H ₂ O—Zincaluminite.....	1278.45	H.	d.	2.26	256
1913	Al ₂ O ₃ .4CuO.SO ₃ .8H ₂ O—Cyanotrichite.....	644.388	R.		2.737	779
1914	(AlCl)O.6CuO.SO ₃ .9H ₂ O—Spangolite.....		Trig.	d.	3.14	340
1915	3Al ₂ O ₃ .CuO.2P ₂ O ₅ .9H ₂ O—Turquoise.....	831.565	Tri.	d. 300	2.67	782
1916	4Al ₂ O ₃ .18CuO.5As ₂ O ₅ .55H ₂ O—Liroconite.....	3980.39		d.	2.96	830
1917	Al ₂ O ₃ .MnO.....	172.850	C.		4.12	
1918	Al ₂ O ₃ .MnO.4SO ₃ .24H ₂ O—Apjohnite.....	925.480	M.		1.782	477
1919	Al ₂ O ₃ .2MnO.P ₂ O ₅ .4H ₂ O—Eosphorite.....	457.890	R.		3.13	837
1920	Al ₂ O ₃ .MnO.2SiO ₂ .2H ₂ O—Carpholite.....	329.001	R.		2.94	801
1921	Al ₂ O ₃ .3MnO.3SiO ₂ —Spessartite.....	494.890	C.		4.180	167
1922	Al ₂ O ₃ .7MnO.8SiO ₂ .6H ₂ O—Ganophyllite.....	1187.00	M.		2.84	914
1923	Al ₂ O ₃ .FeO—Hercynite.....	173.760	C.		3.93	165
1924	Al ₂ O ₃ .FeO.4SO ₃ .24H ₂ O—Halotrichite.....	926.390	M.		2.04	505
1925	Al ₂ O ₃ .FeO.P ₂ O ₅ .11H ₂ O—Paravauxite.....	513.977	Tri.	d.	2.3	681
1926	Al ₂ O ₃ .2FeO.P ₂ O ₅ .4H ₂ O—Childrenite.....	459.710	R.	d.	3.23	876

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
78 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 82 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{4}^{20}	Ref. ind. finding No.
1927	$2\text{Al}_2\text{O}_3 \cdot 4\text{FeO} \cdot 3\text{P}_2\text{O}_5 \cdot 24\text{H}_2\text{O}$ —Vauxite.....	1349.71	Tri.		2.45	677
1928	$\text{Al}_2\text{O}_3 \cdot 3\text{FeO} \cdot 3\text{SiO}_2$ —Almandite.....	497.620	C.		4.04	166
1929	$\text{Al}_2\text{O}_3 \cdot 3\text{FeO} \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$ —Daphnite.....	491.608	M.			826
1930	$5\text{Al}_2\text{O}_3 \cdot 2\text{FeO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Staurolite.....	910.528	R.		3.7	930
1931	$\text{Al}_2\text{O}_3 \cdot \text{CoO}$	176.890	C.		4.37_4^{18}	
1932	$3\text{Al}_2\text{O}_3 \cdot 4\text{CoO}$	605.640			4.80	
1933	AlB_{12}	156.800	M.		2.5	
1934	$\text{Al}_2\text{O}_3 \cdot \text{B}_2\text{O}_3$ —Jeremejevite.....	171.560	H.		3.3	313
1935	$\text{BO}_2(\text{AlO})_3$	187.700	R.			758
1936	$\text{C}_2\text{B}_{12} \cdot 3\text{AlB}_{12}$	624.240	Tet.		2.615	
1937	$8\text{Al}_2\text{O}_3 \cdot \text{B}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Dumortierite...	1263.38	R.		3.3	886
1938	Sc_2O_3	138.200			3.86_4	
1939	ScCl_3	151.474		939		
1940	ScBr_3	284.848			3.91	
1941	$\text{Sc}_2(\text{SO}_4)_3$	378.395			2.57_9	
1942	$\text{Sc}(\text{NO}_3)_3$	231.124		150		
1943	$\text{Sc}(\text{NO}_3)_3 \cdot 4\text{H}_2\text{O}$	303.186		d. 100		
1944	$\text{Sc}_2\text{O}_3 \cdot 2\text{SiO}_2$ —Thortveitite.....	258.320	R.		3.57	946
1945	Yt_2O_3	226.000		2410	4.84	
1946	YtCl_3	195.374		<686	2.8_4^{18}	
1947	$\text{YtCl}_3 \cdot \text{H}_2\text{O}$	213.389		160		
1948	$\text{Yt}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	634.887		74		
1949	$\text{Yt}_2(\text{SO}_4)_3$	466.195			2.612	
1950	$\text{Yt}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	610.318	M.		2.558	661
1951	$\text{Yt}_2\text{O}_3 \cdot \text{P}_2\text{O}_5$ —Xenotime.....	368.048	Tet.		4.6	348
1952	$\text{Yt}_4(\text{P}_2\text{O}_7)_3$	878.144			3.059	
1953	YtC_2	113.000			4.13	
1954	$\text{Yt}(\text{CH}_3\text{CO}_2)_3 \cdot 4\text{H}_2\text{O}$	338.131	Tri.		1.696	
1955	$\text{Yt}(\text{C}_2\text{H}_5\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1163.90	H.		1.764_4^{18}	238
1956	$2\text{Yt}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Thalenite.....	710.255	M.		4.23	925
1957	$\text{Yt}_2\text{Pt}_2(\text{CN})_{12} \cdot 21\text{H}_2\text{O}$	1453.90	R.		2.376	
1957.1	$\text{Yt}_2(\text{MoO}_4)_3$	658.000		1347	4.79_4^{18}	415
1958	La_2O_3	325.820		>2000	6.51	
1959	LaCl_3	245.284		907	3.947_4^{18}	
1960	$\text{LaCl}_3 \cdot 7\text{H}_2\text{O}$	371.392		d. 91		
1961	$\text{La}(\text{BrO}_3)_3 \cdot 2\text{H}_2\text{O}$	558.689		d. 150		
1962	$\text{La}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	684.797		37.5		
1963	LaS_2	203.040		d. 650		
1964	La_2S_3	374.015			4.91_1^{11}	
1965	$\text{La}_2(\text{SO}_4)_3$	566.015			3.600	
1966	$\text{La}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$	728.154			2.821	
1967	$(\text{NH}_4)_2\text{La}_2(\text{SO}_4)_4 \cdot 8\text{H}_2\text{O}$	842.281	M.		2.516	
1968	$\text{La}_2\text{O}_3 \cdot 5\text{P}_2\text{O}_5$	1036.06	M.		3.241	
1969	LaC_2	162.910			5.02	
1970	$\text{La}(\text{C}_2\text{H}_5\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$	1213.81	H.		1.845_4^{18}	224
1971	$\text{Ti}_2\text{La}(\text{NO}_3)_8 \cdot 4\text{H}_2\text{O}$	929.812		72 d.	3.318_0^0	
1972	$\text{Zn}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1650.43		98.0	2.161_0^0	
1973	$\text{La}_2\text{Pt}_2(\text{CN})_{12} \cdot 18\text{H}_2\text{O}$	1499.88	M.		2.626	
1974	$\text{Mn}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1619.08		87.2	2.080_0^0	
1975	$\text{Co}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1631.20		101.8	2.131_0^0	
1976	$\text{Ni}_2\text{La}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1630.36		110.5	2.146_0^0	
1976.1	$\text{La}_2(\text{MoO}_4)_3$	757.820	Tet.	1181	4.77_4^{18}	
1977	CeO_2	172.250	C.	1950	7.3	
1978	CeF_3 —Fluocerite.....	197.250	H.	1324	5.8	298
1979	CeCl_3	246.624		848	3.92_4^0	
1980	$\text{Ce}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	686.137	H.	49		
1981	Ce_2S_3	376.695			5.02_0^{11}	
1982	$\text{Ce}_2(\text{SO}_4)_3$	568.695			3.912	
1983	$\text{Ce}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$	658.772	M.		3.17	
1984	$\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	712.818	Tri.	630	2.886_4^{17}	
1985	$\text{Ce}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$	730.834	H.		2.831	
1986	$\text{Ce}_2(\text{S}_2\text{O}_8)_3 \cdot 15\text{H}_2\text{O}$	1031.12	Tri.		2.288	560
1987	Ce_2SeO_4	423.700	R.		4.456	748

Ag	Al	As	At	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
37	13	33		54	56	4	81	35	12	20	27	48	58	17	25	24	55	29	67	69	70	71	26	64	31	28	65	72	73	80	53	54	62	74	36	57	82	75

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1988	$(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6 \cdot 4\text{H}_2\text{O}$	558.429	M.	74		
1989	$(\text{NH}_4)_2\text{SO}_4 \cdot \text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	844.961	M.		2.52 ₃	
1990	CePO_4	235.274			5.2 ₂	
1991	$\text{Ce}(\text{PO}_3)_3$	377.322			3.27	
1992	CeC_2	164.250			5.2 ₃	
1993	$\text{Ce}(\text{C}_2\text{H}_3\text{O}_2)_2$	258.296		308 d.		
1994	$\text{CeOF} \cdot \text{CO}_2$ —Bastnäsité	219.250	H.		5.0	346
1995	$\text{Ce}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1215.15	H.		1.930 ₃ ¹⁸	225
1996	CeSi_2	196.370			5.67 ₁₇	
1997	$\text{Ti}_2\text{Ce}(\text{NO}_3)_8 \cdot 4\text{H}_2\text{O}$	931.152		64.5 d.	3.32 ₆ ⁹	
1998	$\text{Zn}_2\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1653.11	Trig.	92.8	2.18 ₈ ⁹	
1999	$\text{Ce}_2\text{Pt}_2(\text{CN})_{12} \cdot 18\text{H}_2\text{O}$	1502.56	M.		2.657	
2000	$\text{Mn}_2\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1621.76		83.7	2.102 ₀ ⁹	
2001	$\text{Co}_2\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1633.88		98.5	2.157 ₀ ⁹	
2002	$\text{Ni}_2\text{Ce}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1633.04		108.5	2.173 ₀ ⁹	
2002.1	$\text{Ce}_2(\text{MoO}_4)_3$	760.480	R. Tet.	973	4.83	416
2003	$\text{Ce}_2(\text{WO}_4)_3$	1024.50	Tet.	1089	6.77 _{16.5} ¹⁸	
2004	$\text{Ce}_2\text{O}_3 \cdot 3\text{Al}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$ —Florencite	1026.45	Trig.		3.59	337
2005	Pr_2O_3	329.840			6.87	
2006	Pr_4O_7	675.680			6.71 ₅	
2007	$\text{Pr}_{10}\text{O}_{18}$	1697.20			6.70 ₄	
2008	PrCl_3	247.294		81 ₈	4.020 ₄ ¹⁸	
2009	$\text{Pr}(\text{BrO}_3)_3$	524.668		d. 150		
2010	$\text{Pr}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	686.807	II.	56.5		
2011	Pr_2S_3	378.035			5.04 ₂ ¹¹	
2012	$\text{Pr}_2(\text{SO}_4)_3$	570.035			3.72 ₀ ¹⁶	
2013	$\text{Pr}_2(\text{SO}_4)_3 \cdot 5\text{H}_2\text{O}$	660.112	M.		3.17 ₃	
2014	$\text{Pr}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	714.158	M.		2.82	663
2015	$\text{Pr}_2(\text{SeO}_4)_3$	711.440			4.30 ₁₆ ¹⁸	
2016	$\text{Pr}_2(\text{SeO}_4)_3 \cdot 8\text{H}_2\text{O}$	855.563			3.094 _{13.5} ¹⁸	
2017	PrC_2	164.920			5.1	
2018	$\text{Pr}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1215.82	H		1.876 ₃ ¹⁸	226
2019	$\text{Zn}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1654.45	Trig.	91.5	2.20 ₂ ⁹	
2020	$\text{Mn}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1623.10		81.0	2.109 ₀ ⁹	
2021	$\text{Co}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1635.22		97.0	2.176 ₀ ⁹	
2022	$\text{Ni}_2\text{Pr}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1634.38		108.0	2.195 ₀ ⁹	
2023	Nd_2O_3	336.540			7.24	
2024	NdCl_3	250.644		784	4.134 ₄ ¹⁸	
2025	$\text{NdCl}_3 \cdot 6\text{H}_2\text{O}$	358.736		124	2.282 ₄ ^{16.5}	
2026	$\text{Nd}(\text{BrO}_3)_3 \cdot 2\text{H}_2\text{O}$	564.049		d. 150		
2027	$\text{Nd}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	690.157	H	66.7		
2028	Nd_2S_3	384.735			5.17 ₉ ¹¹ ?	
2029	$\text{Nd}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	720.858	M.		2.850	668
2030	NdC_2	168.270			5.1 ₅	
2031	$\text{Nd}(\text{C}_2\text{H}_3\text{SO}_4)_6 \cdot 18\text{H}_2\text{O}$	1219.17	H.		1.883 ₃ ¹⁸	227
2032	$\text{Zn}_2\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1661.15		88.5	2.215 ₀ ⁹	
2033	$\text{Mn}_2\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1629.80		77.0	2.114 ₀ ⁹	
2034	$\text{Co}_2\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1641.92		95.5	2.195 ₀ ⁹	
2035	$\text{Ni}_2\text{Nd}_2(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$	1641.08		105.6	2.202 ₀ ⁹	
2035.1	$\text{Nd}_2(\text{MoO}_4)_3$	768.540	Tet.	1176	5.14 ₁₈ ¹⁸	414
2036	$(\text{NdPr})_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$		M.			658
2037	Sa_2O_3	348.860			7.43	
2038	SaCl_3	221.346			3.69 ₂₂	
2039	SaCl_3	256.804		686	4.46 ₁₈ ¹⁸	
2040	$\text{SaCl}_3 \cdot 6\text{H}_2\text{O}$	364.896	Tri.		2.383	
2041	SaOCl	201.888			7.02	
2042	$\text{SaBr}_3 \cdot 6\text{H}_2\text{O}$	498.270			2.971	
2043	$\text{Sa}(\text{BrO}_3)_3 \cdot 2\text{H}_2\text{O}$	570.209		d. 150		
2044	$\text{Sa}(\text{BrO}_3)_3 \cdot 9\text{H}_2\text{O}$	696.317	H.	75		
2045	Sa_2S_3	397.055			3.7	
2046	$\text{Sa}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$	733.178	M.		2.930	670
2047	$\text{Sa}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$	444.546	Tri.		2.375	
2048	SaPO_4	245.454			5.83 _{17.5} ¹⁸	

76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	8
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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2049	SaC ₃	174.430			5.86	
2050	Sa(CHO ₂) ₂	285.453			3.733	
2051	Sa(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	399.561			1.94	
2052	Sa(C ₂ H ₃ O ₂) ₂	369.546			1.894	
2053	Sa(C ₂ H ₃ O ₂) ₂ ·3H ₂ O.....	423.592			1.786	
2054	Sa(C ₂ H ₃ SO ₄) ₂ ·18H ₂ O.....	1225.33	H.		1.904 ₄ ¹⁵	234
2055	Zn ₃ Sa ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1673.47		76.5	2.283 ₂ ⁹	
2056	Mn ₃ Sa ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1642.12		70.2	2.188 ₂ ⁹	
2057	Co ₃ Sa ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1654.24		83.2	2.237 ₂ ⁹	
2058	Ni ₃ Sa ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1653.40		92.2	2.272 ₄ ⁹	
2059	Sa ₂ O·B ₂ O ₃	386.500			6.05	
2060	Eu ₂ O ₃	352.000			7.42	
2061	Eu(C ₂ H ₃ SO ₄) ₂ ·18H ₂ O.....	1226.90	H.		1.909 ₂ ¹⁵	239
2062	Gd ₂ O ₃	362.520			7.407	
2063	GdCl ₃	263.634		62.8	4.52 ₁ ⁹	
2064	GdCl ₃ ·6H ₂ O.....	371.726			2.424 ₂ ⁹	
2065	GdBr ₃ ·6H ₂ O.....	505.100			2.844 ₄ ¹⁵	
2066	Gd ₂ (SO ₄) ₃	602.715			4.13 ₉ ^{14,6}	
2067	Gd ₂ (SO ₄) ₃ ·8H ₂ O.....	746.838	M.		3.01 ₀ ^{14,6}	
2068	Gd(NO ₃) ₃ ·5H ₂ O.....	433.361		92	2.40 ₆ ¹⁵	
2069	Gd(NO ₃) ₃ ·6H ₂ O.....	451.376	Tri.	91	2.332	
2070	Gd ₂ (C ₂ O ₄) ₃ ·10H ₂ O.....	758.674		110		
2071	Gd(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	406.391	Tri.		1.611	
2072	Gd(C ₂ H ₃ SO ₄) ₂ ·18H ₂ O.....	1232.16	H.		1.919 ₂ ¹⁵	235
2073	Zn ₃ Gd ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1687.13		56.5	2.351 ₂ ⁹	
2074	Gd ₂ Pt ₂ (CN) ₁₂ ·21H ₂ O.....	1590.63	R.		2.563	
2075	Co ₃ Gd ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1667.90		63.2	2.315 ₂ ⁹	
2076	Ni ₃ Gd ₂ (NO ₃) ₁₂ ·24H ₂ O.....	1667.06		72.5	2.356 ₂ ⁹	
2077	TbCl ₃	265.574		58.8	4.35 ₁ ⁹	
2078	Tb(NO ₃) ₃ ·6H ₂ O.....	453.316	M.	89.3		
2079	Dy ₂ O ₃	373.040			7.81	
2080	DyCl ₃	268.894		68.0	3.67 ₂ ⁹	
2081	Dy(C ₂ H ₃ SO ₄) ₂ ·18H ₂ O.....	1237.42	H.		1.492 ₂ ¹⁵	240
2082	Er ₂ O ₃	383.400			8.640	
2083	Er ₂ (SO ₄) ₃	623.595			3.67 ₈	
2084	Er ₂ (SO ₄) ₃ ·8H ₂ O.....	767.718			3.180	
2085	Er(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	416.831	Tri.		2.114	
2086	Er(C ₂ H ₃ SO ₄) ₂ ·18H ₂ O.....	1242.60	H.		1.907 ₂ ¹⁵	233
2087	Yb ₂ O ₃	395.200			9.17	
2088	YbCl ₃ ·6H ₂ O.....	388.066			2.57 ₅	
2089	Yb ₂ (SO ₄) ₃	635.395			3.79 ₃	
2090	Yb ₂ (SO ₄) ₃ ·8H ₂ O.....	779.518			3.28 ₆	
2091	Yb ₂ (SeO ₄) ₃	776.800			4.140	
2092	Yb ₂ (SeO ₄) ₃ ·8H ₂ O.....	920.923			3.30	
2093	Yb(NO ₃) ₃ ·4H ₂ O.....	431.686			2.68 ₂	
2094	Yb ₂ (CO ₃) ₂ ·4H ₂ O.....	599.262			3.67	
2095	Yb(C ₂ O ₄) ₃	437.600			2.439	
2096	Yb(C ₂ O ₄) ₃ ·10H ₂ O.....	617.754			2.644	
2097	Yb(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	422.731			2.09	
2098	LuCl ₃	281.374		>916	3.98	
2099	HfO ₂	211.000		281.2	9.68	
2099.5	HfOCl ₂ ·8H ₂ O.....	410.039				270.5
2099.6	(NH ₄) ₂ HfF ₇	366.034	C.			70.1
2100	BeO.....	25.0200	H.	2400	3.02 ₅	347
2101	BeF ₂	47.0200			1.2.1 ₁₅	
2102	2BeO·5BeF ₂	285.140			2.3	
2103	BeCl ₂	79.9360		440	1.89 ₂ ¹⁵	
2104	BeBr ₂	168.852		490		
2105	BeI ₂	262.884		510	4.20 ₁₅	
2106	BeSO ₄	105.085			2.44 ₃	
2107	BeSO ₄ ·4H ₂ O.....	177.147	Tet.		1.71 ₃ ^{10,5}	219
2108	BeSeO ₄ ·4H ₂ O.....	224.282	R.		2.03	537
2109	Be ₃ N ₂	55.0760		2200		

Ag 32	Al 55	As 33	Au 79	B 54	Ba 75	Be 75	Bi 15	Br 5	C 16	Ca 77	Cb 51	Cd 59	Co 44	Cr 46	Cs 85	Cu 31	Dy 67	Er 69	Eu 64	F 3	Fe 43	Ga 25	Gd 65	Ge 20	Gl 75	H 2	Hf 73	Hg 80	Ho 68	I 53	In 6	Ir 36	K 39	La 57	Li 3	Mn 25	Nb 41	Ni 58	Os 76	Pb 82	Re 75	Rh 45	Sb 51	Se 34	Sn 50	Ta 73	Tb 61	Ti 22	U 92	V 23	W 74	Xe 54	Y 39	Yb 70	Zn 65	Zr 40
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Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2110	Be(NO ₃) ₂ ·3H ₂ O	187.082		60		
2111	Be ₂ C	30.0400			1.9 ¹⁵	
2112	Be(C ₂ H ₃) ₂	67.0970				
2113	Be(C ₂ H ₇) ₂	95.1278				
2114	Be(C ₂ H ₇ O ₂) ₂ —Acetylacetonate	207.128	M.	108	1.168 ⁴	
2115	BeO·3Be(C ₂ H ₃ O ₂) ₂	170.126		284	1.36 ⁴	
2116	BeO·3Be(C ₂ H ₃ O ₂)(C ₂ H ₅ O ₂)	448.265		127		
2117	BeO·3Be(C ₂ H ₃ O ₂) ₂	490.311		120		
2118	BeO·3Be(C ₂ H ₃ O ₂) ₂	574.403				
2119	BeO·Be(C ₂ H ₃ SO ₄) ₂ ·4H ₂ O	356.309	Tet.			220
2120	BeO·SiO ₂	85.0800		>1755		
2121	2BeO·SiO ₂ —Phenacite	110.100	Tri.		3.0	326
2122	4BeO·2SiO ₂ ·H ₂ O—Bertrandite	238.215	R.		2.6	764
2123	BeOH·BeBO ₃ —Hambergite	93.8677	R.		2.35	733
2124	BeO·Al ₂ O ₃ —Chrysoberyl	126.940	R.		3.76	933
2125	3BeO·Al ₂ O ₃ ·6SiO ₂ —Beryl	537.340	H.	1410	2.66	284
2126	2BeO·Al ₂ O ₃ ·2SiO ₂ ·H ₂ O—Euclase	290.095	M.		3.1	839
2127	2BeO·Yt ₂ O ₃ ·FeO·2SiO ₂ —Gadolinite	468.000	M.		4.3	947
2128	MgO—Periclase	40.3200	C.	2800	3.65	158
2129	MgO·H ₂ O—Brucite	58.3354	Trig.		2.4	272
2130	MgF ₂ —Sellaite	62.3200	Tet.	1396	3.0	208
2131	MgCl ₂ —Chloromagnesite	95.2360	H.	712	2.325	335
2132	MgCl ₂ ·6H ₂ O—Bischofite	203.328	M.	118 d.	1.56	562
2133	Mg(ClO ₃) ₂ ·6H ₂ O	299.328		35	1.80	
2134	Mg(ClO ₄) ₂	223.236		d. 251	2.60 ¹⁵	
2135	Mg(ClO ₄) ₂ ·6H ₂ O	331.328		147	1.970 ¹⁵	
2136	MgBr ₂	184.152		700	3.72	
2137	Mg(BrO ₃) ₂ ·6H ₂ O	388.244	C.			117
2138	MgI ₂	278.184			4.25	
2139	Mg(IO ₃) ₂ ·4H ₂ O	446.246	M.		3.3 ¹⁵	
2140	MgS	56.3850			2.80	
2141	MgSO ₄	120.385		1185	2.66	
2142	MgO·SO ₃ ·H ₂ O—Kieserite	138.400	M.		2.57	637
2143	MgSO ₄ ·5H ₂ O	210.462	Tri.		1.718	511
2144	MgSO ₄ ·6H ₂ O—Hexahydrite	228.477	M.		1.76	
2145	MgO·SO ₃ ·7H ₂ O—Epsomite	246.493	R.		1.68	447
2146	MgS ₂ O ₆ ·6H ₂ O	292.542	Tri.		1.666	
2147	MgSeO ₄ ·6H ₂ O	275.612	M.		1.928	503
2148	MgO·N ₂ O ₅ ·H ₂ O—Nitromagnesite	166.351				558
2149	Mg(NO ₃) ₂ ·6H ₂ O	256.428		95	1.464	
2150	(NH ₄) ₂ O·MgO·2SO ₃ ·6H ₂ O— Boussingaultite	360.620	M.	>120	1.70	464
2151	(NH ₄) ₂ O·MgO·2SeO ₃ ·6H ₂ O	454.890	M.		2.04	568
2152	Mg ₃ P ₂ O ₇	222.688			2.598 ²²	761
2153	2MgO·P ₂ O ₅ ·7H ₂ O—Newberyite	348.796	R.		2.10	585
2154	3MgO·P ₂ O ₅ ·8H ₂ O—Bobierite	407.131	M.		2.41	595
2155	Mg(H ₂ PO ₄) ₂ ·6H ₂ O	262.491	Tet.		1.59 ¹³	
2156	3MgO·P ₂ O ₅ ·MgF ₂ —Wagnerite	325.328	M.		3.12	701
2157	(NH ₄) ₂ O·2MgO·P ₂ O ₅ ·12H ₂ O—Struvite	490.950	R.		1.72	522
2158	3MgO·(NH ₄) ₂ O·2P ₂ O ₅ ·10H ₂ O— Hannayite	637.288	Tri.		1.89	703
2159	3MgO·As ₂ O ₃ ·8H ₂ O—Hoernesite	495.003	M.		2.60	702
2160	(NH ₄)MgAsO ₄ ·6H ₂ O	289.411			1.932 ¹⁵	
2161	Mg ₃ Sb ₂	316.500		961		
2162	Mg ₃ Bi ₂	490.960		715		
2163	MgO·CO ₂ —Magnesite	84.3200	Trig.		3.037	342
2164	MgO·CO ₂ ·3H ₂ O—Nesquehonite	138.366	R.		1.850	542
2165	MgO·CO ₂ ·5H ₂ O—Lansfordite	174.397	M.		1.73	459
2166	2MgO·CO ₂ ·4H ₂ O—Artinite	196.702	R.		2.02	630
2167	4MgO·3CO ₂ ·4H ₂ O—Hydromagnesite	365.342	R.		2.16	622
2168	Mg(d-C ₄ H ₉ O ₈) ₂ ·5H ₂ O	262.428	M.		1.67	
2169	Mg(d-C ₄ H ₉ O ₈) ₂ ·4H ₂ O	394.459	R.		1.72	
2170	Mg(C ₂ H ₃ O ₂) ₂	142.366		323	1.42	

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Str	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
78	42	47	11	23	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	52	66	10	24	19	27	70	49	50	48	57	71	28	21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2171	Mg(C ₂ H ₃ O ₂) ₂ ·4H ₂ O.....	214.428	M.		1.454	512
2172	Mg(CH ₃ SO ₃) ₂ ·4H ₂ O—Ethane disulfonate	284.542	Tri.		1.727	
2173	MgC ₁₀ H ₈ O ₈ S ₂ ·6H ₂ O—1, 5-Naphthalene disulfonate.....	418.589	M.		1.64	777
2174	Mg ₂ Si.....	76.7000		1102		
2175	MgO·SiO ₂ —Clinoenstatite.....	100.380	M.	1557 d.	3.28	836
2176	MgO·SiO ₂ —Enstatite.....	100.380	R.	d.	3.19	832
2177	2MgO·SiO ₂ —Forsterite.....	140.700	R.	1890	3.26	828
2178	2MgO·3SiO ₂ ·4H ₂ O—Parasepiolite.....	332.882	R.			557
2179	3MgO·2SiO ₂ ·2H ₂ O—Chrysotile.....	277.111	R.		2.5	647
2180	3MgO·3SiO ₂ ·2H ₂ O—Antigorite.....	337.171	R.		2.62	545
2181	3MgO·4SiO ₂ ·H ₂ O—Talc.....	379.215	M.		2.75	728
2182	MgSiF ₆ ·6H ₂ O.....	274.472	Trig.			204
2183	2MgO·SiO ₂ ·Mg(F, OH) ₂ —Proectite.....		M.		3.1	861
2184	4MgO·2SiO ₂ ·Mg(F, OH) ₂ —Chondrodite..		M.		3.15	781
2185	6MgO·3SiO ₂ ·Mg(F, OH) ₂ —Humite.....		R.		3.15	790
2186	8MgO·4SiO ₂ ·Mg(F, OH) ₂ —Clinohumite..		M.		3.1	863
2187	MgO·TiO ₂ —Geikielite.....	120.220	Trig.		3.98	402
2188	MgSnCl ₆ ·6H ₂ O.....	463.860	Trig.		2.08	289
2189	2(MgPb)O·SiO ₂ ·H ₂ O—Molybdophyllite..		H.		4.72	367
2190	MgCl ₂ ·2CdCl ₂ ·12H ₂ O.....	678.073	R.			629
2191	MgHg ₂ I ₈ ·7H ₂ O.....	1313.24			3.8°	
2192	MgPtCl ₆ ·6H ₂ O.....	540.390	Trig.		2.437	
2193	MgPtBr ₆ ·12H ₂ O.....	915.231	Trig.		2.802	
2194	MgPdCl ₆ ·6H ₂ O.....	451.860	H.		2.12	
2195	Mg ₂ MnCl ₆ ·12H ₂ O.....	532.503	H.		1.802	
2196	MgO·Fe ₂ O ₃ —Magnesioferrite.....	200.000	C.		4.6	194
2197	MgO·Fe ₂ O ₃ ·3SO ₃ ·13H ₂ O—Quetenite....	674.395	M.		2.12	626
2198	2MgO·Fe ₂ O ₃ ·4SO ₃ ·15H ₂ O—Botryogenite.	830.811	M.		2.1	660
2199	6MgO·Fe ₂ O ₃ ·CO ₂ ·12H ₂ O—Pyroaurite....	661.785	H.		2.07	275
2200	6MgO·Fe ₂ O ₃ ·CO ₂ ·12H ₂ O—Brugnatellite .	661.785	H.		2.07	264
2201	3(Fe, Mg)O·Fe ₂ O ₃ ·2SiO ₂ ·3H ₂ O—Cronstedtite.....		Trig. ?		3.34	363
2202	MgO·CoO.....	131.290			5.06	
2203	Mg ₂ Ni ₂ O ₄ ·3SiO ₂ ·6H ₂ O—Genthite.....	486.292	R. ?		2.5	
2204	MgCrO ₄ ·7H ₂ O.....	266.438	R.		1.695	665
2205	MgO·Cr ₂ O ₃	192.340			4.50	
2206	MgCrO ₄ ·(NH ₄) ₂ CrO ₄ ·6H ₂ O.....	400.510	M.		1.84	813
2207	6MgO·Cr ₂ O ₃ ·CO ₂ ·12H ₂ O—Stichtite.....	654.125	H.		2.16	265
2208	MgW ₄ O ₁₂ ·8H ₂ O.....	1112.44	M.			926
2209	3MgO·5V ₂ O ₅ ·28H ₂ O.....	3407.09	Tri.		2.180	
2210	4MgO·Cb ₂ O ₃	427.480	H.		4.4	
2211	MgO·B ₂ O ₃ ·3H ₂ O—Pinnoite.....	164.006	Tet.		2.30	277
2212	2MgO·B ₂ O ₃ ·H ₂ O—Ascharite.....	168.295			2.7	666
2213	2MgO·B ₂ O ₃ ·H ₂ O—Camsellite.....	168.295	R. ?			1041
2214	3MgO·B ₂ O ₃	190.600	R.		2.99	833
2215	6MgO·8B ₂ O ₃ ·MgCl ₂ —Boracite impure....	894.276	R. C.	Tr. 265 R. to C.	2.9	856
2216	10MgO·4B ₂ O ₃ ·3H ₂ O—Szaibelyite.....	735.806			3	321
2217	6MgO·2B ₂ O ₃ ·2SO ₃ ·9H ₂ O—Sulfoborite....	703.469	R.		2.4	650
2218	3MgO·B ₂ O ₃ ·P ₂ O ₅ ·8H ₂ O—Lueneburgite...	476.771	M.		2.1	649
2219	3MgO·B ₂ O ₃ ·MnO·Mn ₂ O ₃ —Pinakiolite....	419.390	R.		3.9	999
2220	3MgO·B ₂ O ₃ ·FeO·Fe ₂ O ₃ —Ludwigite.....	422.120	R.		4.0	972
2221	4MgO·B ₂ O ₃ ·Fe ₂ O ₃ —Magnesioludwigite....	390.600	R.		4.0	971
2222	MgO·Al ₂ O ₃ —Spinel.....	142.240	C.	2135	3.6	156
2223	MgO·Al ₂ O ₃ ·4SO ₃ ·22H ₂ O—Pickeringite....	858.839	M.		1.85	473
2224	6MgO·Al ₂ O ₃ ·CO ₂ ·12H ₂ O—Hydrotalcite...	604.025	H.		2.06	247
2225	3MgO·Al ₂ O ₃ ·3SiO ₂ —Pyrope.....	403.060	C.		3.5	154
2226	4MgO·Al ₂ O ₃ ·2SiO ₂ ·5H ₂ O—Colerainite....	473.397	H.		2.51	273
2227	5MgO·Al ₂ O ₃ ·3SiO ₂ ·4H ₂ O—Leuchtenbergite.....	555.762	M.		2.7	726
2228	5MgO·Al ₂ O ₃ ·6SiO ₂ ·4H ₂ O—Zebedassite...	735.942			2.19	590
2229	5MgO·6Al ₂ O ₃ ·2SiO ₂ —Sapphirine.....	933.240	M.		3.45	900
2230	(FeMg)O·Al ₂ O ₃ ·P ₂ O ₅ ·H ₂ O—Lazulite.....		M.		3.1	804

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	Kr	La	Li	Mn	Nb	Ni	Os	P	Pb	Pr	Rb	S	Sb	Se	Si	Sn	Te	Ti	Tl	Tm	U	V	Zn	Zr																																						
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2231	Mg ₂ Gd ₂ (NO ₃) ₁₂ ·24H ₂ O	1563.95	Trig.	77.5	2.163 ₄ ⁹	
2232	CaO—Lime	56.0700	C.	257 ₂	3.40	168
2233	CaH ₂	42.0854		d. 675	1.7	
2234	Ca(OH) ₂	74.0854	R. Trig.		2.343	318
2235	CaF ₂ —Fluorite	78.0700	C.	1360	3.180	71
2236	CaCl ₂ —Hydrophyllite	110.986	C.	772	2.152 ₄ ²¹	120
2237	CaCl ₂ ·6H ₂ O	219.078	Trig.	29.92	1.68 ¹⁷	212
2238	CaF ₂ ·CaCl ₂	189.056		d. 737	3.07	
2239	CaBr ₂	199.902		765	3.353 ₄ ²²	
2240	CaBr ₂ ·3H ₂ O	253.948	R.	80.5		
2241	CaBr ₂ ·6H ₂ O	307.994	H.	38.2		
2242	Ca(BrO ₃) ₂ ·H ₂ O	313.917	M.	d.	3.329	
2243	CaF ₂ ·CaBr ₂	277.972			3.15 ¹⁸	
2244	CaI ₂	293.934		575	3.956 ₄ ²³	
2245	CaI ₂ ·6H ₂ O	402.026		42		
2246	Ca(IO ₃) ₂ —Lautarite	389.934	Tri.		4.591 ¹⁵	
2247	CaS—Oldhamite	72.1350	C.		2.8 ¹⁴	
2248	CaSO ₄ —Anhydrite	136.135	R. M.	Tr. 1193 (R. to M.) M. 1450	2.96	708
2249	CaSO ₄ ·2H ₂ O—Gypsum	172.166	M.		2.32	600
2250	CaS ₂ O ₆ ·4H ₂ O	272.262	Trig.		2.176	269
2251	CaSeO ₄	183.270			2.93	
2252	CaSeO ₄ ·2H ₂ O	219.301	M.		2.676	
2253	Ca ₃ N ₂	148.226		900	2.63 ¹⁷	
2254	Ca(NO ₃) ₂	100.086			2.53 ₄ ²⁰	
2255	Ca(NO ₃) ₂ ·H ₂ O	150.101	H.		2.23 ²⁴	
2256	Ca(NO ₃) ₂ ·4H ₂ O	204.148			1.674 ₆ ⁹	
2257	Ca(NO ₃) ₂ —Nitrocalcite	164.086	C.	561	2.36	
2258	Ca(NO ₃) ₂ ·3H ₂ O	218.132		51.1		
2259	Ca(NO ₃) ₂ ·4H ₂ O (α)	236.148	M.	42.7	1.82	526
2260	Ca(NO ₃) ₂ ·4H ₂ O (β)	236.148		39.7		
2261	Ca ₃ P ₂	182.258		> 1600	2.51 ¹⁵	
2262	Ca ₃ P ₂ O ₈	198.118		975	2.82	
2263	Ca ₃ P ₂ O ₇	254.188		1230	3.09	
2264	2CaO·P ₂ O ₅ ·H ₂ O—Monetite	272.204	Tri.	d.	2.75	586
2265	2CaO·P ₂ O ₅ ·5H ₂ O—Brushite	344.265	M.		2.25	656
2266	Ca ₃ (PO ₄) ₂	310.258		1670	3.14	
2267	Ca ₄ P ₂ O ₉	366.328	M.	1630	3.06	148
2268	4CaO·P ₂ O ₅ ·5H ₂ O—Isoclasite	456.405	M.		2.92	698
2269	5CaO·2P ₂ O ₅ ·1.5H ₂ O—Martinite	591.469	M. ?		2.89	765
2270	10CaO·3P ₂ O ₅	986.844		1540	2.89	
2271	Ca(H ₂ PO ₄) ₂	234.149	Tri.	d.	2.546 ^{15, 16}	
2272	Ca(H ₂ PO ₄) ₂ ·H ₂ O	252.164	Tri.	d.	2.220 ¹⁶	
2273	CaF ₂ ·3Ca ₃ P ₂ O ₈ —Fluoroapatite	1008.84	H.	1630	3.18 ²⁵	309
2274	Ca ₃ P ₂ ClO ₁₂ —Chloroapatite	520.880		1530	3.17 ²⁰	331
2275	3Ca ₃ (PO ₄) ₂ ·CaFCl—Apatite	1025.30		1270	3.14	308
2276	(NH ₄)CaPO ₄ ·7H ₂ O	279.241	M.	d.	1.561 ¹⁵	
2277	Ca ₃ As ₂	270.130			2.5 ¹⁵	
2278	2CaO·As ₂ O ₅ ·3H ₂ O—Haidingerite	396.106	R.		2.967	756
2279	2CaO·As ₂ O ₅ ·5H ₂ O—Pharmacolite	432.137	M.		2.535	730
2280	2CaO·As ₂ O ₅ ·8H ₂ O—Wapplerite	486.183	Tri.		2.48	621
2281	9CaO·3As ₂ O ₅ ·CaF ₂ —Svabite	1272.46	H.		3.80	345
2282	5CaO·3Sb ₂ S ₃ —Romeite	1491.95	C.		5.04	169
2283	CaC ₂	64.0700		2300	2.22	
2284	CaCO ₃ —Aragonite	100.070	R.		2.93	880
2285	CaCO ₃ —Calcite	100.070	H.	1339 ⁷⁷⁹ 000mm	2.711 ₄ ^{25, 26}	328
2286	CaCO ₃ ·6H ₂ O	208.162	M.			633
2287	CaC ₂ O ₄	128.070			2.2 ⁴	
2288	CaO·C ₂ O ₃ ·H ₂ O—Whewellite	146.085	M.		2.23	674
2289	Ca(CHO ₂) ₂	130.085	R.	d.	2.015	577
2290	CaC ₄ H ₂ O ₄ ·H ₂ O—Maleate	172.101	R.			706
2291	CaC ₄ H ₂ O ₄ ·2H ₂ O—Fumarate	190.116	R.			754

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sa Sb Se Si Sn Sr Tb Th To Ti Tl Tm U V W Y Yb Zn Zr
 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2292	$\text{CaC}_4\text{H}_4\text{O}_4 \cdot 3\text{H}_2\text{O}$ —Malate.....	194.147	R.			676
2293	$\text{CaC}_4\text{H}_4\text{O}_4 \cdot 3\text{H}_2\text{O}$ —Succinate.....	210.147				648
2294	$\text{Ca}(\text{meso-C}_4\text{H}_4\text{O}_4) \cdot 3\text{H}_2\text{O}$	242.147	Tri.			609
2295	$\text{Ca}(d\text{-C}_4\text{H}_4\text{O}_4) \cdot 4\text{H}_2\text{O}?$	260.162	R.			638
2296	$\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$	158.116				683
2297	$\text{Ca}(\text{C}_3\text{H}_5\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ —Lactate.....	218.147		100		
2298	$\text{Ca}(\text{C}_4\text{H}_5\text{O}_2)_2$ —Crotonate.....	210.147				695
2299	$\text{CaC}_9\text{H}_{10}\text{O}_{10} \cdot 6\text{H}_2\text{O}$ —Acid malate.....	414.239	R.			561
2300	$\text{Ca}(\text{C}_6\text{H}_5\text{CO}_2)_2 \cdot 3\text{H}_2\text{O}$	336.193	R.		1.436	
2301	$\text{CaH}_2(\text{C}_4\text{H}_4\text{O}_4)_2 \cdot 2\text{C}_4\text{H}_8\text{O}_6$ — <i>d</i> -Tetratartrate.....	638.239	R.		1.851 ¹⁹	
2302	$\text{Ca}_2\text{C}_{12}\text{H}_8\text{O}_{17}$ —Aconitate.....	462.256				636
2303	$\text{Ca}_2\text{C}_{12}\text{H}_{10}\text{O}_{14} \cdot 2\text{H}_2\text{O}$ —Citrate.....	534.318		130		
2304	$\text{Ca}_2\text{C}_{12}\text{H}_{10}\text{O}_{14} \cdot 4\text{H}_2\text{O}$ —Citrate.....	570.349				618
2305	$\text{Ca}(\text{C}_4\text{H}_7\text{O}_2\text{NO}_2)_2 \cdot x\text{H}_2\text{O}$ —Nitrotetronate.....		M.		1.745	822
2306	$\text{Ca}(\text{C}_6\text{H}_5\text{NO}_2)_2 \cdot 3\text{H}_2\text{O}$ —Hippurate.....	450.255	R. ?		1.318	
2307	$7\text{CaO} \cdot \text{CO}_2 \cdot 2\text{P}_2\text{O}_5$ —Dahllite.....	720.586	H.		3.08	310
2308	$10\text{CaO} \cdot \text{CO}_2 \cdot 3\text{P}_2\text{O}_5$ —Podolite.....	1030.84	H.		3.077	807
2309	$10\text{CaO} \cdot \text{CaF}_2 \cdot \text{CO}_2 \cdot 3\text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$ —Francolite.....	1126.92	H.		3.1	304
2310	CaSi	68.1300			2.35 ¹⁶	
2311	CaSi_2	96.1900			2.5	
2312	Ca_2Si_2	176.330			1.64	
2313	$\text{Ca}_6\text{Si}_{10}$	521.020		1200		
2314	CaSiO_3	116.130	H.		2.89	299
2315	$\text{CaO} \cdot \text{SiO}_2$ —Pseudowollastonite.....	116.130	M.	1540		773
2316	$\text{CaO} \cdot \text{SiO}_2$ —Wollastonite.....	116.130	M.	Tr. 1200	2.9	800
2317	$\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Okenite.....	194.205	R.		2.3	578
2318	$2\text{CaO} \cdot \text{SiO}_2 (\alpha)$	172.200	M. Tri.	2130		908
2319	$2\text{CaO} \cdot \text{SiO}_2 (\beta)$	172.200	M. R.	Tr. 1420 β to α		1049
2320	$2\text{CaO} \cdot \text{SiO}_2 (\gamma)$	172.200	M.	Tr. 675 γ to β		824
2321	$2\text{CaO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$ —Hillebrandite.....	190.215	R. ?		2.69	772
2322	$2\text{CaO} \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$ —Riversideite.....	286.306			2.61	751
2323	$3\text{CaO} \cdot 2\text{SiO}_3$	288.330	R.	1475 d.		1046
2324	$4\text{CaO} \cdot 4\text{SiO}_2 \cdot 7\text{H}_2\text{O}$ —Crestmorite.....	590.628			2.22	759
2325	$\text{CaSiF}_6 \cdot 2\text{H}_2\text{O}$	218.161	Tet.		2.25	
2326	$3\text{CaO} \cdot \text{CaF}_2 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ —Zeophyllite.....	462.491	Trig.		2.76	276
2327	$3\text{CaO} \cdot \text{CaF}_2 \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Custerite.....	365.415	M.		2.96	732
2328	$5\text{CaO} \cdot \text{SiO}_2 \cdot \text{P}_2\text{O}_5$	482.458		1760	3.01	
2329	$3\text{CaO} \cdot \text{SiO}_2 \cdot \text{CO}_2 \cdot \text{SO}_3 \cdot 15\text{H}_2\text{O}$ —Thaumasite.....	622.566	H.		1.87	243
2330	$5\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{CO}_2$ —Spurrite.....	444.470	M. ?		3.01	867
2331	$\text{CaO} \cdot \text{TiO}_2$ —Perovskite.....	135.970	R.		4.10	1025
2332	$\text{CaTi}(\text{SO}_4)_2$	376.165	C.			91
2333	$5\text{CaO} \cdot 2\text{TiO}_2 \cdot 3\text{Sb}_2\text{O}_3$ —Lewsite.....	1410.77	C.		4.95	184
2334	$\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$ —Titanite.....	196.030	M.	1142	3.5	983
2335	$\text{CaO} \cdot \text{SnO}_2 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ —Stokesite.....	422.981	R.		3.2	776
2336	$\text{Ca}_2\text{PbC}_{18}\text{H}_{20}\text{O}_{12}$ —Propionate.....	725.571	Tet.			251
2337	$2\text{CaO} \cdot \text{PbO} \cdot 3\text{SiO}_2$	515.520			3.99	955
2338	$4\text{CaO} \cdot 6\text{PbO} \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Ganomalite.....	1902.86	Tet.		5.74	985
2339	$4\text{CaO} \cdot 5\text{PbO} \cdot \text{PbCl}_2 \cdot 6\text{SiO}_2$ —Nasonite.....	1978.76	H.		5.7	380, 384
2340	$\text{CaO} \cdot \text{ZnO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$ —Clinohedrite.....	215.525	M.		3.33	862
2341	$2\text{CaO} \cdot \text{ZnO} \cdot \text{SiO}_2$ —Hardystonite.....	253.580	Tet.		3.4	332
2342	CaHgI_4	748.408			3.30°	
2343	$\text{CaHg}_2\text{I}_{12} \cdot 8\text{H}_2\text{O}$	2710.43			4.69°	
2344	$\text{Ca}_2\text{Hg}_4\text{I}_{14} \cdot 24\text{H}_2\text{O}$	3132.07			3.61°	
2345	$\text{CaSO}_4 \cdot 3\text{Cu}(\text{OH})_2 \cdot \text{CuSO}_4 \cdot 3\text{H}_2\text{O}$ — Urvolgyite.....	574.542	R.		3.132	
2346	$2\text{CaO} \cdot 2\text{CuO} \cdot \text{As}_2\text{O}_3 \cdot \text{H}_2\text{O}$ —Higginsite.....	519.215	R.		4.33	965
2347	$\text{CaCu}(\text{C}_2\text{H}_3\text{O}_2)_4 \cdot 6\text{H}_2\text{O}$	357.748	Tet.		1.42	213
2348	$\text{CaPt}(\text{CN})_4 \cdot 5\text{H}_2\text{O}$	429.409	R.			1045
2349	$2\text{CaO} \cdot \text{MnO} \cdot \text{P}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$ —Fairfieldite.....	361.149	Tri.		3.07	823
2350	$2\text{CaO} \cdot \text{MnO} \cdot \text{As}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ —Brandtite.....	449.021	Tri.		3.671	902
2351	$\text{CaO} \cdot \text{MnO} \cdot \text{SiO}_2$ —Glaucochroite.....	187.060	R.		3.41	910

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	La	Ir	K	La	Li	Lu
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	20	53	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2352	4CaO.2Mn ₂ O ₃ .5SiO ₂ .4H ₂ O—Orientite....	912.362	R.		3.1	943
2353	4CaSiO ₃ .3MnSiO ₃ —Bustamite.....	857.490	Tri.			868
2354	CaO.Fe ₂ O ₃	215.750		1216 d.		408
2355	2CaO.Fe ₂ O ₃	271.820		1436 d.		1057
2356	2CaO.FeO.P ₂ O ₅ .4H ₂ O—Anapaite.....	398.090	Tri.		2.82	778
2357	6CaO.3Fe ₂ O ₃ .4P ₂ O ₅ .19H ₂ O—Calcioferrite	1725.94	M.		2.53	282
2358	3CaO.2Fe ₂ O ₃ .2As ₂ O ₃ .6H ₂ O— Arseniosiderite.....	1055.50	R.		3.36	376
2359	FeCa ₂ (CN) ₆ .12H ₂ O.....	508.212	Tri.			718
2360	CaO.FeO.2SiO ₂ —Hedenbergite.....	248.030	M.	1100	3.7	922
2361	2CaO.4FeO.Fe ₂ O ₃ .4SiO ₂ .H ₂ O—Ilvaite....	817.435	R.		4.0	984
2362	CaO.Cr ₂ O ₃	208.090			4.8 ¹⁸	
2363	15CaO.8CrO ₃ .7I ₂ O ₅ —Dietzeite.....	397.818	M.		3.70	970
2364	3CaO.Cr ₂ O ₃ .3SiO ₂ —Uvarovite.....	500.410	C.		3.42	170
2365	CaMoO ₄ —Powellite.....	200.070	Tet.		4.35	388
2366	CaO.WO ₃ —Scheelite.....	288.070	Tet.		6.06	381
2367	CaO.8UO ₃ .2SO ₃ .25H ₂ O—Uranopilite.....	2505.56	Tri. ?		3.8	788
2368	CaO.2UO ₃ .P ₂ O ₅ .8H ₂ O—Autunite.....	914.581	R.		3.1	707
2369	CaO.2UO ₃ .P ₂ O ₅ .8H ₂ O—Bassetite.....	914.581	M.		3.10	705
2370	CaO.2UO ₃ .As ₂ O ₃ .8H ₂ O—Uranospinite....	1002.45	R.		3.45	719
2371	2CaO.UO ₃ .4CO ₂ .10H ₂ O—Uranothallite....	738.464	R.		2.8	547
2372	CaO.2UO ₃ .2SiO ₂ .6H ₂ O—Uranophane....	856.622	Tri. ?		3.9	855
2373	CaV ₄ O ₁₁	419.910		637		
2374	CaO.3V ₂ O ₅ .9H ₂ O—Hewettite.....	763.969	R.		2.554	1011
2375	CaO.3V ₂ O ₅ .9H ₂ O—Metaheewettite.....	763.969	R.		2.51	1003
2376	2CaO.3V ₂ O ₅ .11H ₂ O—Pascoite.....	856.069	M.		2.46	961
2377	CaCl ₂ .Ca ₂ (VO ₄) ₂	461.116	R.		4.01	
2378	CaB ₄	104.990			2.3	
2379	CaO.B ₂ O ₃	125.710	R.	1100		841
2380	2CaO.B ₂ O ₃	181.780		1304		
2381	2CaO.3B ₂ O ₃ .5H ₂ O—Colemanite.....	411.137	M.	d.	2.43	739
2382	2CaO.3B ₂ O ₃ .7H ₂ O—Meyerhofferite.....	447.168	Tri.	d.	2.12	635
2383	2CaO.3B ₂ O ₃ .13H ₂ O—Inyoite.....	555.260	M.	d.	1.87 ₅	570
2384	4CaO.5B ₂ O ₃ .9H ₂ O—Pandermite.....	734.619	M.	d.	2.43	738
2385	5CaO.6B ₂ O ₃ .9H ₂ O—Priceite.....	860.329	Tri.		2.4	735
2386	CaO.2SiO ₂ .B ₂ O ₃ —Danburite.....	245.830	R.		3.0	806
2387	2CaO.2SiO ₂ .B ₂ O ₃ .H ₂ O—Datolite.....	319.915			3.0	831
2388	4CaO.5B ₂ O ₃ .2SiO ₂ .5H ₂ O—Howlite.....	782.677	M.		2.6	746
2389	8CaO.5B ₂ O ₃ .6SiO ₂ .6H ₂ O—Bakerite.....	1265.21			2.8	721
2390	CaO.B ₂ O ₃ .SnO ₂ —Nordenskiöldine.....	276.410	Trig.		4.2	
2391	CaO.Al ₂ O ₃	157.990	M. ?, Tri.	1600		838
2392	3CaO.Al ₂ O ₃	270.130	?	1535 d.		155
2393	3CaO.5Al ₂ O ₃	677.810	Tet. ?, R.	1720		300
2394	5CaO.3Al ₂ O ₃	586.110	C.	1455		141
2395	CaF ₂ .Al(F, OH) ₃ .H ₂ O—Gearsutite.....		M.		2.77	445
2396	CaF ₂ .2Al(F, OH) ₃ .H ₂ O—Prosopite.....		M. Tri.		2.88	548
2397	6CaO.Al ₂ O ₃ .3SO ₃ .33H ₂ O—Ettringite.....	1273.04	H.		1.75	231
2398	CaO.2CaF ₂ .2Al(F, OH) ₃ .SO ₃ .2H ₂ O— Creedite.....		M.		2.73	470
2399	CaO.2Al ₂ O ₃ .P ₂ O ₅ .5H ₂ O—Crandallite.....	492.035	R.		3.5	294
2400	CaO.Al ₂ O ₃ .2SiO ₂ —Anorthite.....	278.110	Tri.	1551	2.765	723
2401	CaO.Al ₂ O ₃ .2SiO ₂ .2H ₂ O—Hibschite.....	314.141	C.		3.05	149
2402	CaO.Al ₂ O ₃ .2SiO ₂ .2H ₂ O—Lawsonite.....	314.141	R.		3.09	869
2403	CaO.Al ₂ O ₃ .3SiO ₂ .5H ₂ O—Levynite.....	428.247	Trig.		2.1	241
2404	CaO.Al ₂ O ₃ .4SiO ₂ .4H ₂ O—Gismondite.....	470.292		1550	2.3	644
2405	CaO.Al ₂ O ₃ .4SiO ₂ .4H ₂ O—Laumontite.....	470.292	M.		2.3	605
2406	CaO.Al ₂ O ₃ .6SiO ₂ .5H ₂ O—Epistilbite.....	608.427	M.		2.25	572
2407	CaO.Al ₂ O ₃ .6SiO ₂ .5H ₂ O—Heulandite.....	608.427	M.		2.2	528
2408	CaO.Al ₂ O ₃ .7SiO ₂ .7H ₂ O—Stellerite.....	704.518	R.		2.12	509
2409	CaO.2Al ₂ O ₃ .2SiO ₂ .H ₂ O—Margarite.....	398.045	M.		3.0	820
2410	2CaO.Al ₂ O ₃ .SiO ₂ —Velardenite.....	274.120	Tet.	1590	3.04	333
2411	2CaO.Al ₂ O ₃ .3SiO ₂ .H ₂ O—Prehnite.....	412.255	R.		2.9	796
2412	2CaO.Al ₂ O ₃ .5SiO ₂ .6H ₂ O—Laubaniite.....	622.452	M. ?		2.2	221

Mg Mn Mo Ni Nb Nb Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sb Se Si Sn Sr Th Tb Tl Th Ti Tl Tm U V W Y Yb Zn Zr
 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_{40}°	Ref. ind. finding No.
2413	2CaO.3Al ₂ O ₃ .9SiO ₂ —Didymolite.....	958.440	M.		2.71	540
2414	3CaO.Al ₂ O ₃ .SiO ₂	330.190	R.			1048
2415	3CaO.Al ₂ O ₃ .3SiO ₂ —Grossularite.....	450.310	C.		3.530	157
2416	3CaO.Al ₂ O ₃ .6SiO ₂ .H ₂ O—Bavenite.....	648.505	M.		2.72	717
2417	4CaO.3Al ₂ O ₃ .6SiO ₂ —Meionite.....	890.400	Tet.		2.74	295
2417.1	4CaO.3Al ₂ O ₃ .6SiO ₂ .H ₂ O—Clinozoisite....	908.415	M.		3.36	915
2418	4CaO.3Al ₂ O ₃ .6SiO ₂ .H ₂ O—Zoisite.....	908.415	R.		3.3	896
2419	3CaO.5Ce ₂ O ₃ .6P ₂ O ₅ .24H ₂ O—Churchite....	3095.37	M.		3.14	785
2420	CaO.2CeOF ₃ .3CO ₂ —Parisite.....	538.570	Trig.		4.32	279
2421	CaPO ₄ .BeOH—Hydro-herderite.....	161.122	R.		3.00	774
2422	CaCl ₂ .2MgCl ₂ .12H ₂ O—Tachyhydrite....	517.643	H.	> 168 d.	1.665	249
2423	2CaO.2MgO.As ₂ O ₅ .H ₂ O—Adelite.....	440.715	M.		3.76	909
2424	2CaO.MgO.As ₂ O ₅ .MgF—Tilasite.....	425.700	M.		3.28	847
2425	CaO.MgO.2CO ₂ —Dolomite.....	184.390	Trig.		2.872	339
2426	CaO.MgO.SiO ₂ —Monticellite.....	156.450	R.	d. 1498	3.2	852
2427	CaO.MgO.2SiO ₂ —Diopside.....	216.510	M.	1391	3.3	864
2428	CaO.3MgO.2SiO ₂ —Merwinite.....	297.150	M.		3.15	901
2429	CaO.3MgO.4SiO ₂ —Tremolite.....	417.270	M.		3.0	786
2430	2CaO.MgO.2SiO ₂ —Åkermannite.....	272.580	Tet.	1458	2.944	307
2431	5CaO.2MgO.6SiO ₂	721.350		d. 1365		797
2432	CaO.MgO.3B ₂ O ₃ .6H ₂ O—Hydroboracite....	413.402	M.		2.0	631
2433	CaO.MgO.Al ₂ O ₃ .SiO ₂ —Gehlenite.....	258.370	Tet.		3.04	330
2434	SrO.....	103.620	R.	2430	4.7	
2435	Sr(OH) ₂	121.635			3.625	
2436	Sr(OH) ₂ .8H ₂ O.....	265.758	Tet.		1.90	242
2437	SrF ₂	125.620	C.	1190	2.44	
2438	SrCl ₂	158.536	C.	873	3.052	140
2439	SrCl ₂ .6H ₂ O.....	266.628	Trig.	d. 61	1.93	257
2440	Sr(ClO ₃) ₂	254.536	R.	120 d.	3.152	763
2441	SrF ₂ .SrCl ₂	284.156	Tet.	962	4.18	324
2442	SrBr ₂	247.452		643	4.216 ²⁴	
2443	SrBr ₂ .6H ₂ O.....	355.544		d. 20	2.358 ¹⁸	
2444	Sr(BrO ₃) ₂ .H ₂ O.....	361.467	M.	d.	3.773	
2445	SrBr ₂ .SrF ₂	373.072			4.06	
2446	SrI ₂	341.484		402	4.549 ²⁵	
2447	Sr(IO ₃) ₂	437.484	Tri.		5.045 ¹⁶	
2448	SrI ₂ .SrF ₂	467.104			4.5	
2449	SrS.....	119.685	C.		3.70 ¹⁶	
2450	SrS ₄ .6H ₂ O.....	323.972		25		
2451	SrO.SO ₃ —Celestite.....	183.685	R.	1580 d.	3.96	789
2452	SrS ₂ O ₃ .5H ₂ O.....	289.827	M.	d.	2.17 ¹⁷	
2453	SrS ₂ O ₄ .4H ₂ O.....	319.812	Trig.		2.373	253
2454	Sr(NO ₃) ₂	147.636			2.683	
2455	Sr(NO ₃) ₂ .5H ₂ O.....	237.713			2.173 ²⁰	
2456	Sr(NO ₃) ₂	179.636			2.867 ²⁷	
2457	Sr(NO ₃) ₂ .H ₂ O.....	197.651		d.	2.408 ⁹	
2458	Sr(NO ₃) ₂	211.636	C.	570	2.986	135
2459	Sr(NO ₃) ₂ .4H ₂ O.....	283.698	M.		2.2	
2460	Sr ₃ P ₂	324.908			2.68	
2461	SrHPO ₄	183.652	R.		3.544	
2462	SrC ₂	111.620			3.2	
2463	SrO.CO ₂ —Strontianite.....	147.620	R.	1497 ²⁰ at.	3.70	853
2464	Sr(CHO ₂) ₂	177.635	R.	71.9	2.69	704
2465	Sr(CHO ₂) ₂ .H ₂ O.....	195.651	R.		2.25	
2466	Sr(CHO ₂) ₂ .2H ₂ O.....	213.666	R.		2.695	597
2467	Sr(C ₂ H ₃ O ₂) ₂	205.666			2.099	
2468	Sr(CH ₂ SO ₃) ₂ .H ₂ O—Ethane disulfonate....	293.796	M.		2.355 (α) 2.453 (β)	
2469	Sr(C ₂ H ₃ O ₄ S) ₂ .2H ₂ O—Ethylsulfate.....	373.858	M.		2.032	554
2470	Sr(C ₄ H ₃ O ₂ NO ₂) ₂ .xH ₂ O—Nitrotetronate..		M.		2.043	812
2471	Sr(SbOC ₄ H ₄ O ₆) ₂	627.222	H.			426
2472	SrSiO ₃	163.680		1580	3.65	60
2473	2SrO.SiO ₂	267.300		> 1700	3.84	

Ag Al As Au
32 55 13 33

B Ba Be Bi Br
54 79 75 15 5

C Ca Cb Cd Ce
16 77 81 29 59

Cl Co Cr Cs Cu
4 44 46 85 31

Dy Er Eu F Fe
67 69 64 8 43

Ga Gd Ge Gh H
25 65 20 75 2

Hi Hg Ho I In
73 80 68 6 26

K La Li Lu
39 57 39 71

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2474	SrSiF ₆ ·2H ₂ O.....	265.711	M.		2.99 ^{17.5}	
2475	SrCl ₂ ·2CdCl ₂ ·7H ₂ O.....	651.296	M.		2.718 ²⁴	
2476	SrHg ₂ I ₁₂ ·8H ₂ O.....	2757.98			4.66 ⁹	
2477	Sr ₂ Cu(CHO ₂) ₄ ·8H ₂ O.....	562.964	Tri.			593
2479	SrCrO ₄	203.630	M.		3.895 ¹⁵	
2480	SrCr ₂ O ₇ ·3H ₂ O.....	357.686	M.			905
2481	Sr(OCrO ₂ Cl) ₂ ·4H ₂ O.....	430.618		72		
2482	SrMoO ₄	247.620			4.145	
2483	SrWO ₄	335.620			6.184	
2484	Sr ₂ W ₁₂ SiO ₄₀ ·16H ₂ O.....	3339.55	M.			934
2485	SrB ₄	152.540			3.3	
2486	SrO·B ₂ O ₃	173.260		1100		
2487	SrO·2B ₂ O ₃	242.900		930		
2488	2SrO·B ₂ O ₃	276.880		1130		
2489	2SrO·3Al ₂ O ₃ ·2P ₂ O ₅ ·7H ₂ O—Goyazite.....	923.204	Trig.		3.2	305
2490	2SrO·3Al ₂ O ₃ ·P ₂ O ₅ ·2SO ₃ ·6H ₂ O— Svanbergite.....	923.270	Trig.		3.5	314
2491	SrO·Al ₂ O ₃ ·2SiO ₂	325.660		>1700		
2492	3SrO·2Ce ₂ O ₃ ·7CO ₂ ·5H ₂ O—Ancylite.....	1365.94	R.		3.95	974
2493	SrCa ₂ C ₁₈ H ₁₀ O ₁₇ —Propionate.....	605.991	Tet.			230
2494	BaO.....	153.370	C.	1923	5.72	
2495	BaO ₂	169.370			4.96	
2496	BaH ₂	139.385		d. 675	4.21 ⁹	
2497	Ba(OH) ₂	171.385	M.		4.495	
2498	Ba(OH) ₂ ·8H ₂ O.....	315.509	M.	77.9	2.1 ₃	544
2499	BaF ₂	175.370	C.	1280	4.83	
2500	BaCl ₂	208.286	M.	Tr. 925	3.856 ²⁴	
			C.	962		
2501	BaCl ₂ ·2H ₂ O.....	244.317	R.		3.097 ²⁴	825
2502	Ba(ClO) ₂	240.286		d. 235		
2503	Ba(ClO ₂) ₂	304.286		414		
2504	Ba(ClO ₂) ₂ ·H ₂ O.....	322.301	M.	d. 120	3.179	713
2505	Ba(ClO ₄) ₂	336.286		505		
2506	Ba(ClO ₄) ₂ ·3H ₂ O.....	390.332	H.		2.74	
2507	BaClF.....	191.828	Tet.	1008	5.931	315
2508	BaCl ₂ ·BaF ₂	383.656			4.51 ¹⁸	
2509	BaBr ₂	297.202		847	4.781 ²⁴	
2510	BaBr ₂ ·2H ₂ O.....	333.233	M.		3.582 ²⁴	913
2511	Ba(BrO ₃) ₂ ·H ₂ O.....	411.217	M.		3.99 ¹⁸	
2512	BaBr ₂ ·BaF ₂	472.572			4.96 ¹⁸	
2513	BaI ₂	391.234		740 d.	5.15 ₁	
2514	BaI ₂ ·6H ₂ O.....	499.326	H.	25.7		
2515	BaI ₂ ·7H ₂ O.....	517.342			3.67	
2516	Ba(IO ₃) ₂	487.234	M.		5.2 ₃	
2517	Ba(IO ₃) ₂ ·H ₂ O.....	505.249	M.		5.0 ¹⁵	
2518	BaI ₂ ·BaF ₂	566.604			5.21 ¹⁸	
2519	BaS.....	169.435	C.		4.25 ¹⁵	
2520	BaS ₄ ·2H ₂ O.....	301.661	R.	d.	2.988	
2521	BaO·SO ₃ —Barite.....	233.435	R.	Tr. 1149 to M. ? 1580	4.499 ¹⁵	816
2522	BaS ₂ O ₃ ·H ₂ O.....	267.515	R.		3.45 ¹⁸	
2523	BaS ₂ O ₆ ·2H ₂ O.....	333.531	R. M.		4.536 ^{13.5}	744
2524	BaS ₂ O ₆ ·4H ₂ O.....	369.562	M.		3.142	1076
2525	BaSeO ₄	280.570	R.	d.	4.75	
2526	BaTeO ₄	328.870			4.48 ¹⁶	
2527	BaN ₆	221.418	R.	d. 219		
2528	Ba(NO) ₂	197.386			3.891 ²³	
2529	Ba(NO ₂) ₂	229.386		217	3.23 ²³	
2530	Ba(NO ₂) ₂ ·H ₂ O.....	247.401			3.173 ²⁹	
2531	Ba(NO ₃) ₂ —Nitrobarite.....	261.386	C.	592	3.244 ²³	137
2532	Ba(NH ₂) ₂	169.417		280		
2533	Ba ₂ P ₂ O ₇	448.788	R.		4.1 ¹⁶	
2534	Ba ₃ (PO ₄) ₂	602.158	C.		4.1 ¹⁶	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sa Sb Se Si Sn Sr Tl Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 78 48 47 11 32 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2535	BaHPO ₄	233.402	R.		4.165 ¹⁵	
2536	BaH ₄ (PO ₃) ₂ .H ₂ O.....	285.464	M.		2.90 ¹⁷	
2537	BaF ₂ .3Ba ₃ P ₂ O ₈	1981.84	H.	1670		334
2538	BaCl ₂ .3Ba ₃ P ₂ O ₈	2014.76	H.	1584	5.949	343
2539	Ba ₃ As ₂	562.030			4.1 ¹⁵	
2540	BaHAsO ₄ .H ₂ O.....	295.353	R. M.		3.93 ¹⁵	
2541	BaC ₂	161.370			3.75	
2542	BaCO ₃ —Witherite.....	197.370	R.	Tr. 811 to α	4.43	875
2543	BaCO ₃ (α).....	197.370	H.	Tr. 982 to β		
2544	BaCO ₃ (β).....	197.370		1740 ⁹⁰ at.		
2545	BaC ₂ O ₄	225.370			2.658	
2546	Ba(CHO ₂) ₂	227.385	R.		3.21	745
2547	BaC ₂ H ₂ O ₆ —Malonate.....	239.385			2.147 ¹⁸	
2548	Ba(<i>meso</i> -C ₄ H ₄ O ₆).H ₂ O.....	303.416			2.98	
2549	Ba(<i>dl</i> -C ₄ H ₄ O ₆).5H ₂ O.....	375.478	M.			1051
2550	Ba(C ₂ H ₃ O ₂) ₂	255.416			2.468	
2551	Ba(C ₂ H ₃ O ₂) ₂ .H ₂ O.....	273.432	Tri.		2.19	582
2552	Ba(C ₂ H ₃ O ₂) ₂ .3H ₂ O.....	309.462	Tri.		2.021	
2553	Ba(C ₂ H ₃ CO ₂) ₂ .H ₂ O.....	301.462	R.			584
2554	Ba(CH ₂ SO ₃) ₂ —Ethane disulfonate.....	325.531	R.		2.779	
2555	BaC ₆ H ₄ O ₇ S ₂ .4H ₂ O—Phenol-2, 4-disulfonate.....	461.592	M.			767
2556	BaC ₁₀ H ₆ O ₈ S ₂ .H ₂ O—Naphthalene-1, 5-disulfonate.....	441.562	R.		2.282	904
2557	BaSiO ₃	213.430		1604	4.399	872
2558	BaSiO ₃ .6H ₂ O.....	321.522	R.		2.59	659
2559	BaO.2SiO ₂	273.490	R.	1420	3.73	775
2560	2BaO.SiO ₂	366.800		> 1755		1052
2561	2BaO.3SiO ₂	486.920		1450	3.93	795
2562	BaSiF ₆	279.430			4.279 ¹⁵	
2563	BaO.TiO ₂ .3SiO ₂ —Benitoite.....	413.450	H.		3.7	356
2564	BaCdCl ₄ .4H ₂ O.....	463.674	Tri.		2.968	827
2565	BaCdBr ₄ .4H ₂ O.....	641.506	Tri.		3.687	894
2566	BaCd(CHO ₂) ₄ .2H ₂ O.....	465.842	M.			627
2567	BaHg ₄ I ₁₂	2692.60			4.63 ⁰	
2568	Ba ₃ Hg ₄ I ₁₆ .16H ₂ O.....	3734.32			4.06	
2569	BaPtBr ₆ .10H ₂ O.....	992.250	M.		3.713	
2570	BaPt(CN) ₄ .4H ₂ O.....	508.694	M.		3.05	1047
2571	BaO.MnO ₂	240.300			5.85	
2572	BaO.FeO.4SiO ₂ —Gillespite.....	465.450	Trig.		3.33	302
2573	4BaO.FeO.2Fe ₂ O ₃ .10SiO ₂ —Taramellite.....	1605.28	R.		3.92	942
2574	BaNi ₂ O ₆	334.750			4.8	
2575	BaCrO ₄	253.380			4.498 ¹⁵	
2576	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂	1044.13			2.57	
2577	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂ .7H ₂ O.....	1170.24			2.896 ²⁸	
2578	Ba ₃ [Cr(C ₂ O ₄) ₃] ₂ .12H ₂ O.....	1260.31			2.372 ²⁷	
2579	BaMoO ₄	297.370			4.65	
2580	BaWO ₄	385.370			6.35	
2581	BaO.4WO ₃ .9H ₂ O.....	1243.51	R.		4.30	
2582	Ba ₂ W ₁₂ SiO ₄₀ .16H ₂ O.....	3439.05	M.			962
2583	BaO.2UO ₃ .P ₂ O ₅ .8H ₂ O—Uranocircite.....	1011.88	R.		3.53	787
2584	Ba ₂ V ₂ O ₇	488.660		ca. 863		
2585	3BaO.10WO ₃ .V ₂ O ₅ .SiO ₂ .28H ₂ O.....	3526.52			3.66	
2586	BaB ₃	202.290			4.36	
2587	BaO.B ₂ O ₃	223.010		1060		
2588	2BaO.B ₂ O ₃	376.380		1002		
2589	3BaO.B ₂ O ₃	529.750		1315		
2590	BaCl ₂ .2AlCl ₃	474.954		290		
2591	BaO.Al ₂ O ₃ .2SiO ₂ —Celsian.....	375.410	M.	> 1700	3.37	727
2592	BaO.Al ₂ O ₃ .3SiO ₂ .3H ₂ O—Edingtonite.....	435.470	R.		2.7	662
2593	4BaO.Al ₂ O ₃ .7SiO ₂ —Barylite.....	1135.82	R.		4.03	884
2594	BaF ₂ .Ce ₂ O ₃ .3CO ₂ —Cordylite.....	635.870	H.		4.31	357
2595	BaO.CaO.2CO ₂ —Barytocalcite.....	297.440	M.		3.65	828

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Ch	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	La	Li	Lu	Mg	Mn	Mo	Nb	Ni	N	O	P	Pb	Pr	Rb	S	Sb	Se	Si	Sn	Sr	Ta	Tb	Ti	Tl	Tm	U	V	W	Xe	Y	Yb	Zn	Zr																														
33	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	80	68	6	26	36	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2596	BaCa ₂ C ₁₂ H ₃₀ O ₁₂ —Propionate.....	655.741	C.			73
2597	BaO.2CaO.3SiO ₂	445.690	H. ?	1320 d.		338
2598	RaCl ₂	296.866	M.	1000 Tr. 870	4.91	
2599	RaBr ₂	385.782	M.	728	5.79	
2600	Li ₂ O.....	29.8780		>1700	2.013 ₄ ^{25.2}	
2601	LiH.....	7.94670	C.	680	0.820	
2602	LiOH.....	23.9467		450	2.54	
2603	LiOH.H ₂ O.....	41.9621			1.83	
2604	LiF.....	25.9390	C.	870	2.295 ₄ ^{21.6} l. 1.789 ₄ ⁸⁷⁰	
2605	LiCl.....	42.3970	C.	613	2.068 ₄ ²⁵	
2606	LiClO ₃	90.3970		129		
2607	LiClO ₃ .0.5H ₂ O.....	99.4047		65		
2608	LiClO ₄	106.397		236	2.429	
2609	LiClO ₄ .3H ₂ O.....	160.443	H.	95	1.841	
2610	LiBr.....	86.8550	C.	547	3.464 ₄ ²⁵	
2611	LiBr.2H ₂ O.....	122.886		44		
2612	LiBr.3H ₂ O.....	140.901		3.5		
2613	LiI.....	133.871		446	4.061 ₄ ²⁵ l. 2.827 ₄ ^{873.4}	
2614	LiI.3H ₂ O.....	187.917		73		
2615	Li ₂ S.....	45.9430			1.66	
2616	Li ₂ SO ₄	109.943	M.	860	2.221 l. 2.004 ₄ ⁸⁶⁰	455
2617	Li ₂ SO ₄ .H ₂ O.....	127.958	M.		2.06	469
2618	Li ₂ S ₂ O ₆ .2H ₂ O.....	210.039	R.		2.158	684
2619	LiHSO ₄	104.012			2.123 ₄ ¹³	
2620	LiNO ₃ .H ₂ O.....	70.9624			1.615 ⁰	
2621	LiNO ₃	68.9470	Trig.	255	l. 1.77 ₄ ⁷² 2.38	353
2622	LiNO ₃ .3H ₂ O.....	122.993		d. 29.6		
2623	LiNH ₂	22.9624		390	1.178 ₄ ^{17.5}	
2624	Li ₂ NH.....	28.8937			1.303 ₄ ¹⁹	
2625	LiBr.NH ₃	103.886		97		
2626	LiNH ₄ SO ₄	121.043	M. (α) H. (β) M. (γ ?)		1.204	
2627	LiPO ₃	85.963			2.461	
2628	Li ₃ PO ₄	115.841	R.	837	2.537 ₄ ^{17.5}	
2629	Li ₃ PO ₄ .12H ₂ O.....	332.026	Trig.	100	1.645	
2630	LiH ₂ PO ₄	103.978		>100	2.461	
2631	Li ₃ AsO ₄	159.777			3.07	
2632	Li ₃ Sb.....	142.587		>950	3.2 ₄ ¹⁷	
2633	Li ₂ C ₂	37.8780			1.65 ₄ ¹⁸	
2634	Li ₂ CO ₃	73.8780	M.	618	2.111 ₄ ^{17.5} l. 1.765 ₄ ⁹⁰⁰ 2.121 ₄ ^{17.5}	694
2635	Li ₂ C ₂ O ₄	101.878			1.46	
2636	LiCHO ₂ .H ₂ O.....	69.9621	R.			
2637	LiHC ₄ H ₄ O ₆ .6H ₂ O—Malate.....	248.070	M.			682
2638	LiC ₂ H ₃ O ₂ .2H ₂ O.....	101.993	R.	70		533
2639	Li ₂ (CH ₃ SO ₃) ₂ .2H ₂ O—Ethane disulfonate.....	238.070	M.		1.817	
2640	Li ₂ C ₁₀ H ₆ O ₈ S ₂ .2H ₂ O—Naphthalene 1, 5-disulfonate.....	336.085	M.		1.664	814
2641	LiNH ₄ (d-C ₄ H ₄ O ₆).H ₂ O.....	191.024	M.			614
2642	LiNH ₄ (d-C ₄ H ₄ O ₆).H ₂ O.....	191.024	R.			693
2643	Li ₂ Si ₂	97.7540			1.12	
2644	Li ₂ O.SiO ₂	89.9380	R.	1201	l. 2.33 ₄ ²⁵ 2.52 ₄ ²⁵ 2.454 ₄ ²⁵	55 322, 1042
2645	Li ₂ O.2SiO ₂	149.998		1032 d.		
2646	2Li ₂ O.SiO ₂	119.816		1256	2.28	1043
2647	Li ₂ SiF ₆ .2H ₂ O.....	191.969	M.		2.3	
2648	TiLi(d-C ₄ H ₄ O ₆).2H ₂ O.....	395.401	Tri.		3.144	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Sn So Si Sm Sr Tb Tc Th Ti Tl Tm U V W Y Yb Zn Zr
 78 48 47 11 33 61 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 10 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2649	2LiI.HgI ₂ .6H ₂ O.....	830.308			3.26°	
2650	2LiI.HgI ₂ .8H ₂ O.....	866.339			2.95°	
2651	Li ₂ O.2MnO.P ₂ O ₅ —Lithiophilite.....	313.786	R.		3.5	878
2652	Li ₂ O.2FeO.P ₂ O ₅ —Triphylite.....	315.606	R.		3.55	895
2653	Li(UO ₂)(C ₂ H ₃ O ₂) ₂ .3H ₂ O.....	508.224	M.		2.280 ¹⁵	
2654	Li ₂ O.B ₂ O ₃	99.5180		843		
2655	Li ₂ O.B ₂ O ₃ .16H ₂ O.....	387.764	Trig.	47	1.38	
2656	Li ₂ O.2B ₂ O ₃	169.158		900		
2657	Li ₂ O.Al ₂ O ₃	131.798		> 1625	2.554 ^{18, 1}	
2658	2LiF.Al ₂ O ₃ .P ₂ O ₅ —Amblygonite.....	295.846	Tri.		3.05	740
2659	Li ₂ O.Al ₂ O ₃ .2SiO ₂ —Eucryptite.....	251.918	H.	1388	2.67	268
2660	Li ₂ O.Al ₂ O ₃ .4SiO ₂ —Spodumene.....	372.038	M.	1400	3.2	854
2661	Li ₂ O.Al ₂ O ₃ .5SiO ₂	432.098			2.40	
2662	Li ₂ O.Al ₂ O ₃ .6SiO ₂	492.158			2.41	
2663	Li ₂ O.Al ₂ O ₃ .8SiO ₂ —Petalite.....	612.278	M.	1370	2.4	573
2664	2Li ₂ O.7Al ₂ O ₃ .2B ₂ O ₃ .6SiO ₂ .12H ₂ O— Manandonite.....	1489.02	H.		2.89	749
2665	Na ₂ O.....	61.9940			2.27	
2666	Na ₂ O ₂ .8H ₂ O.....	222.117	H.	d. 30		
2667	NaH.....	24.0047			0.92	
2668	NaOH.....	40.0047		318.4	2.130	
2669	NaOH.3.5H ₂ O.....	103.059		15.5		
2670	NaF—Villiaumite.....	41.9970	Tet.	980	2.79	66
2671	NaCl—Halite.....	58.4550	C.	804	2.163	129
2672	NaOCl.2.5H ₂ O.....	119.494		57.5		
2673	NaOCl.5H ₂ O.....	164.532		24.5		
2674	NaClO ₂	106.455	C. Trig.	248	2.490 ¹⁸	119
2675	NaClO ₄	122.455	R.	482 d.		
2676	NaClO ₄ .H ₂ O.....	140.470	H.	d. 130	2.02	
2677	NaBr.....	102.913	C.	75s	3.205	
2678	NaBr.2H ₂ O.....	138.944	M.	50.7	2.176	
2679	NaBrO ₃	150.913	C.	381	3.339 ^{17, 5}	138
2680	NaI.....	149.929	C.	651	3.667	
2681	NaIO ₃	197.929	R.	d.	4.277	
2682	NaIO ₄	213.929	Tet.	d. 300	3.865 ¹⁸	
2683	NaIO ₄ .3H ₂ O.....	267.975	Trig.		3.219 ¹⁸	
2684	Na ₂ S.....	78.0590			1.856	
2685	Na ₂ S ₂	110.124		445		
2686	Na ₂ S ₃	142.189		223.5		
2687	Na ₂ S ₄	174.254	C.	275		
2688	Na ₂ S ₄ .6H ₂ O.....	282.346		25		
2689	Na ₂ S ₅	206.319		251.8		
2690	Na ₂ SO ₃ .7H ₂ O.....	252.167	M.		1.561	
2691	Na ₂ SO ₄ (α)—Thenardite.....	142.059	R.	Tr. 100	2.69	466
2692	Na ₂ SO ₄	142.059	R.	Tr. 100 to M.	2.698	
			M.	Tr. 500 to H		
			H.	884		
2693	Na ₂ SO ₄ .10H ₂ O—Glaubers salt.....	322.213	M.	d. 32.4	1.464	434
2694	Na ₂ SO ₄ .10H ₂ O—Mirabilite.....	322.213	M.		1.48	428
2695	Na ₂ S ₂ O ₃	158.124	M.		1.667	
2696	Na ₂ S ₂ O ₃ .5H ₂ O.....	248.201	M.	d. 48.0	1.68s	564
2697	Na ₂ S ₂ O ₃ .2H ₂ O.....	242.155	R.		2.189	520
2698	NaHS.3H ₂ O.....	110.116	R.	22		
2699	NaHSO ₄	120.070	Tri.	> 315	2.742	
2700	2Na ₂ O.NaCl.NaF.2SO ₃ —Sulphohalite....	384.570	C.		2.49	76
2701	Na ₂ Se ₄	362.794		—55		
2702	Na ₂ SeO ₄	189.194	R.		3.098	
2703	Na ₂ SeO ₄ .10H ₂ O.....	369.348	M.		1.58	
2704	NaNO ₂	69.0050	R.	271	2.168°	
2705	NaNO ₂ —Soda-niter.....	85.0050	Trig.	308	2.257	288
2706	Na ₂ (NO) ₂	106.010		300 d.	2.466 ³⁰	
2707	NaNH ₂	39.0204		210		
2708	3Na ₂ O.N ₂ O ₂ .2SO ₃ .2H ₂ O—Darapskite....	490.159	M.		2.2	455

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
32	55	13	33	54	79	75	15	5	16	77	61	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	83	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2709	6NaNO ₃ ·2Na ₂ SO ₄ ·3H ₂ O—Nitroglauiberite	848.194	R.			534
2710	NaNH ₄ SO ₄ ·2H ₂ O—Lecontite	173.132	R.	d.	1.63	443
2711	NaPO ₃	102.021		616 d.	2.476	
2712	Na ₂ PO ₄	164.015		1340	2.537 ^{17.5}	
2713	Na ₂ PO ₄ ·12H ₂ O	380.200	Trig.	d. 73.4	1.62	214
2714	(NaPO ₃) ₂ ·2H ₂ O	342.094	Tri.	d.	2.476	
2715	Na ₄ P ₂ O ₇ ·10H ₂ O	430.190	M.		1.832	480
2716	Na ₄ P ₂ O ₇	266.036		988	2.45	
2717	Na ₄ P ₂ O ₇ ·10H ₂ O	446.190	M.	d.	1.82	444
2718	NaH ₂ PO ₄ ·2.5H ₂ O	149.075	M.	42		432
2719	NaH ₂ PO ₄ ·H ₂ O	138.052	R.	d. 190	2.040	487
2720	NaH ₂ PO ₄ ·2H ₂ O	156.067	R.	ca. 60	1.91	450
2721	Na ₂ HPO ₄ ·5H ₂ O	216.103	R.			438
2722	Na ₂ HPO ₄ ·2H ₂ O	178.057	H.		1.848	
2723	Na ₂ HPO ₄ ·7H ₂ O	268.134	M.	d.	1.679	437
2724	Na ₂ HPO ₄ ·12H ₂ O	358.211	R. M.	34.6	1.52	433
2725	Na ₂ H ₂ P ₂ O ₆ ·6H ₂ O	314.150	M.		1.849	504
2726	Na ₂ H ₂ P ₂ O ₇	222.057	M.	d. 220	1.862	
2727	Na ₂ H ₂ P ₂ O ₇ ·6H ₂ O	330.150	M.		1.848	454
2729	Na ₂ HP ₂ O ₆ ·9H ₂ O	390.185	M.	d. 100	1.743	465
2730	Na ₂ PO ₄ ·H ₂ PO ₄ ·15H ₂ O	532.293		55		
2731	Na ₂ PO ₄ ·NaF·12H ₂ O	422.197	C.		2.216	
2732	2Na ₂ PO ₄ ·NaF·19H ₂ O	712.320	C.		2.217	74
2733	NH ₄ NaHPO ₄ ·4H ₂ O—Microcosmic salt, Stercorite	209.129	M.	ca. 79 d.	1.574	436
2734	Na ₂ AsO ₄	207.951			2.835	
2735	Na ₂ AsO ₄ ·12H ₂ O	424.136	Trig.	86.3	1.759	216
2736	NaH ₂ AsO ₄ ·H ₂ O	181.988	R.		2.535	672
2737	NaH ₂ AsO ₄ ·2H ₂ O	200.003	R.		2.309	546
2738	Na ₂ HAsO ₄ ·7H ₂ O	312.070	M.		1.871	556
2739	Na ₂ HAsO ₄ ·12H ₂ O	402.147	M.	28	1.72	441
2740	2Na ₂ AsO ₄ ·NaF·19H ₂ O	800.192	C.		2.85 ²⁵	90
2741	Na ₂ AsS ₄ ·8H ₂ O	416.334	M.	d.		879
2742	2Na ₂ O·As ₂ O ₅ ·2SO ₃	514.038			2.425 ²¹	
2743	(NH ₄)NaHAsO ₄ ·4H ₂ O	253.065	M.		1.845 ¹⁷	457
2744	NaSb	144.767		465		
2745	Na ₂ Sb	190.761		856		
2746	NaSbO ₃ ·3H ₂ O	230.813	R.	d.	2.864	
2747	Na ₂ SbS ₄ ·9H ₂ O	481.160	C.		1.839	
2748	Na ₂ Bi	277.991		775		
2749	Na ₂ C ₂	69.9940			1.575 ¹⁵	
2750	Na ₂ CO ₃	105.994		851	2.533	
2751	Na ₂ CO ₃ ·H ₂ O—Thermonatrite	124.009	R.		1.55	
2752	Na ₂ CO ₃ ·7H ₂ O	232.102	R. Trig.	d. 35.1	1.51	
2753	Na ₂ CO ₃ ·10H ₂ O—Natron	286.148	M.		1.46	431
2754	NaCHO ₂	68.0047	M.	253	1.92	
2755	NaHCO ₃	84.0047	M.		2.20	
2756	NaC ₂ H ₃ O ₂	82.0201		324	1.528	
2757	NaC ₂ H ₃ O ₂ ·3H ₂ O	136.063	M.	58; 78	1.45	452
2758	NaHC ₃ H ₂ O ₄ ·H ₂ O—Acid malonate	144.036	R.			604
2759	NaH(d-C ₄ H ₄ O ₆)·H ₂ O	190.051	R.			628
2760	NaC ₄ H ₇ O ₄ —Diacetate	142.051	C.			79
2761	NaC ₁₈ H ₃₁ O ₂ —Palmitate	278.236		ca. 270		
2762	NaC ₁₈ H ₃₃ O ₂ —Elaidate	304.251		227		
2763	NaC ₁₈ H ₃₃ O ₂ —Oleate	304.251		235		
2764	Na ₂ (d-C ₄ H ₄ O ₆)·2H ₂ O	230.056	R.		1.818	
2765	Na ₂ CO ₃ ·NaHCO ₃ ·2H ₂ O—Tronite	226.030	M.		2.147 ^{21.7}	563
2766	Na ₂ C ₆ H ₅ O ₇ ·5H ₂ O—Citrate	348.107	R.		1.857 ^{23.5}	
2767	NaC ₁₀ H ₈ S ₂ O ₆ ·2H ₂ O—Naphthalene 1, 5-disulfonate	345.040	M.		1.777	809
2768	Na ₂ (CH ₃ SO ₃) ₂ ·2H ₂ O—Ethane disulfonate	270.186	M.		1.939 (α) 1.880 (β)	
2769	NaCN	49.0050		563.7		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pt Rb Rh Ru S Se Sb Sn Sc Sr Ta Tb Te Th Ti Tl Tm U V W Y Yb Zn Zr
 76 43 47 11 82 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 82 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																																																															
2770	$\text{NaNH}_4(\text{meso-C}_4\text{H}_4\text{O}_6)\cdot\text{H}_2\text{O}$	207.082	M.		1.740	1074																																																															
2771	$\text{NaNH}_4(d\text{-C}_4\text{H}_4\text{O}_6)\cdot 4\text{H}_2\text{O}$	261.128	R.		1.587	527																																																															
2772	$\text{NaC}_6\text{H}_5\text{NO}_4$ —Glutamate	169.067	M.			574																																																															
2773	NaSCN	81.0700	R.	562.3																																																																	
2774	$\text{NaC}_6\text{H}_4(\text{NH}_2)\text{SO}_3\cdot 2\text{H}_2\text{O}$ —Sulfanilate	231.147	R.			696																																																															
2775	$\text{NaC}_{10}\text{H}_8\text{NO}_3\text{S}\cdot 4\text{H}_2\text{O}$ —1, 4-Naphthyl-amine sulfonate	317.193	M.			747																																																															
2776	$\text{Na}_2\text{O}\cdot\text{SiO}_2$	122.054		1088		1040																																																															
2777	$\text{Na}_2\text{O}\cdot 2\text{SiO}_2$	182.114	R.	874		571																																																															
2778	Na_2SiF_6	188.054	H.		2.679	202																																																															
2779	$\text{Na}_2\text{O}\cdot 3\text{TiO}_2$	301.694	M.		3.51 ^s																																																																
2780	$\text{Na}_2\text{O}\cdot\text{ZrO}_2\cdot 6\text{SiO}_2\cdot 3\text{H}_2\text{O}$ —Elpidite	599.400	R.		2.58	689																																																															
2781	$\text{Na}_2\text{O}\cdot\text{Pb}(\text{OH})\text{Cl}\cdot\text{SO}_3$ —Caracolite	401.725	R.		4.5	937																																																															
2782	$\text{TiNa}(dl\text{-C}_4\text{H}_4\text{O}_6)\cdot 2\text{H}_2\text{O}$	411.459	Tri.		3.289																																																																
2783	$\text{TiNa}(\text{meso-C}_4\text{H}_4\text{O}_6)\cdot 2.5\text{H}_2\text{O}$	420.466	Tri.		3.120																																																																
2784	$\text{TiNa}(d\text{-C}_4\text{H}_4\text{O}_6)\cdot 4\text{H}_2\text{O}$	447.489	R.		2.580																																																																
2785	$\text{NaTi}_3(d\text{-C}_4\text{H}_4\text{O}_6)_2$	932.259	R.		4.145																																																																
2786	ZnNaPO_4	183.401	R.		3.3																																																																
2787	$\text{Zn}(\text{Na}_2\text{PO}_4)_2$	347.416	C.		2.8																																																																
2788	$\text{Na}_2\text{SO}_4\cdot\text{CdSO}_4$	350.534		551																																																																	
2789	$\text{Na}_2\text{SO}_4\cdot\text{CuSO}_4\cdot 2\text{H}_2\text{O}$ —Kroehnkite	337.725	M.		2.06 ⁴	715																																																															
2790	$\text{Na}_2\text{SO}_4\cdot\text{Cu}(\text{OH})_2\cdot 3\text{CuSO}_4\cdot 3\text{H}_2\text{O}$ —Natrochalcite	772.596	M.	d. 350	2.33	840																																																															
2791	$\text{NaCu}(\text{CN})_2$	138.583		d. 100	1.013																																																																
2792	$\text{Na}_2\text{IrCl}_6\cdot 12\text{H}_2\text{O}$	691.024		50																																																																	
2793	$\text{Na}_2\text{PtCl}_6\cdot 4\text{H}_2\text{O}$	455.118		100 d.																																																																	
2794	$\text{Na}_2\text{PtCl}_6\cdot 6\text{H}_2\text{O}$	562.064	Tri.		2.50																																																																
2795	$\text{Na}_2\text{PtBr}_6\cdot 6\text{H}_2\text{O}$	828.812	Tri.		3.323																																																																
2796	$\text{Na}_2\text{PtI}_6\cdot 6\text{H}_2\text{O}$	1110.91	M. ?		3.707																																																																
2798	$\text{Na}_2\text{Ru}(\text{NO}_3)_6\cdot 2\text{H}_2\text{O}$	413.765	M.			741																																																															
2799	$\text{Na}_2\text{MnP}_2\text{O}_7$	274.972			2.9																																																																
2800	$\text{Na}_2\text{O}\cdot 2\text{MnO}\cdot\text{P}_2\text{O}_5$ —Natrophilite	345.902	R.		3.41	871																																																															
2801	$\text{Na}_4\text{Mn}(\text{PO}_4)_2$	336.966			2.7																																																																
2802	$\text{Na}_2\text{O}\cdot 3\text{Fe}_2\text{O}_3\cdot 4\text{SO}_3\cdot 6\text{H}_2\text{O}$ —Natrojarosite	969.386	R.		3.2	966																																																															
2803	$2\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot 4\text{SO}_3\cdot 7\text{H}_2\text{O}$ —Sideronatrite	684.042	R.		2.2	725																																																															
2804	$3\text{Na}_2\text{SO}_4\cdot\text{Fe}_2(\text{SO}_4)_3\cdot 6\text{H}_2\text{O}$ —Ferrinatrite	934.144	Trig.		2.55	271																																																															
2805	$\text{Na}_6\text{Fe}_2(\text{C}_2\text{O}_4)_6\cdot 10\text{H}_2\text{O}$	957.816	M.		1.973 ^{17,6}																																																																
2806	$\text{Na}_2\text{Fe}(\text{CN})_6\cdot \text{NO}\cdot 2\text{H}_2\text{O}$	297.913	R.		1.72																																																																
2807	$\text{Na}_4\text{Fe}(\text{CN})_6\cdot 12\text{H}_2\text{O}$	520.061	M.		1.458	616																																																															
2808	$\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot 4\text{SiO}_2$ —Aegirite	461.914	M.		3.5	956																																																															
2809	$\text{Na}_2\text{O}\cdot\text{Fe}_2\text{O}_3\cdot\text{FeO}\cdot 0.5\text{SiO}_2$ —Riebeckite	593.814	M.		3.44	887																																																															
2810	$\text{Na}_2\text{O}\cdot 2\text{FeO}\cdot\text{Fe}_2\text{O}_3\cdot 6\text{SiO}_2$ —Crocidolite	725.714	M.		3.2	893																																																															
2811	Na_2CrO_4	162.004	R.	392	2.723																																																																
2812	$\text{Na}_2\text{CrO}_4\cdot 4\text{H}_2\text{O}$	234.066	M.	d. 64.8																																																																	
2813	$\text{Na}_2\text{CrO}_4\cdot 6\text{H}_2\text{O}$	270.096	Tri.	d. 25.9																																																																	
2814	$\text{Na}_2\text{CrO}_4\cdot 10\text{H}_2\text{O}$	342.158	M.		1.483																																																																
2815	$\text{Na}_2\text{Cr}_2\text{O}_7\cdot 2\text{H}_2\text{O}$	298.045	M.	320	2.52 ¹³	892																																																															
2816	$\text{Na}_2\text{O}\cdot 2\text{CrO}_3\cdot \text{I}_2\text{O}_5\cdot 2\text{H}_2\text{O}$	631.909			3.21																																																																
2817	$\text{Na}_2\text{Cr}_2\text{S}_4$	278.274	H.	d.	2.55 ¹⁵																																																																
2818	$\text{NH}_4\text{NaCrO}_4\cdot 2\text{H}_2\text{O}$	193.077	R.	d.	1.842 ¹⁵																																																																
2819	NaCrP_2O_7	249.055	R.		3																																																																
2820	Na_2MoO_4	205.994		687	1.2590 ¹⁰²⁶																																																																
2821	$\text{Na}_2\text{Mo}_2\text{O}_7$	349.994		612																																																																	
2822	$3\text{Na}_2\text{O}\cdot 0.7\text{MoO}_3\cdot 22\text{H}_2\text{O}$	1590.32	M.	ca. 700																																																																	
2823	$3\text{Na}_2\text{O}\cdot 0.5\text{MoO}_3\cdot \text{P}_2\text{O}_5\cdot 14\text{H}_2\text{O}$	1300.25	R.			818																																																															
2824	Na_2WO_4	293.994	R.	698	4.179																																																																
2825	$\text{Na}_2\text{WO}_4\cdot 2\text{H}_2\text{O}$	330.025	R.		1.3613 ^{99c,6}																																																																
2826	$\text{Na}_2\text{W}_2\text{O}_6$	509.994			3.245																																																																
2827	$\text{Na}_2\text{W}_2\text{O}_6$	741.994		d.	7.28																																																																
2828	$\text{Na}_2\text{W}_4\text{O}_{12}$	973.994			6.617																																																																
2829	$\text{Na}_2\text{O}\cdot 4\text{WO}_3\cdot 10\text{H}_2\text{O}$	1170.15	C.	706.6	7.195 ⁴																																																																
2830	$\text{Na}_2\text{W}_5\text{O}_{18}$	1205.99			3.847 ¹³																																																																
					7.283 ¹⁷																																																																
Ag 32	Al 55	As 13	Au 33	B 54	Be 79	Bi 75	Br 5	C 16	Ca 77	Ch 51	Cd 29	Co 59	Cl 44	Cr 46	Cs 85	Cu 31	Dy 67	Er 69	Eu 64	F 9	Fe 43	Ga 25	Gd 65	Ge 20	Gl 75	H 2	Hi 73	Hg 80	Ho 68	I 53	Ir 77	La 57	Li 3	Mg 12	Mn 25	Mo 42	N 7	Na 11	Nb 41	Ne 10	Ni 58	Nm 89	Os 76	P 15	Pb 82	Pr 59	Ra 88	Rb 37	Re 75	Rh 45	S 16	Sa 87	Se 34	Si 14	Sm 62	Sn 50	Sr 38	Ta 73	Tb 61	Tl 81	Tm 69	U 92	V 23	W 74	Xe 54	Y 39	Yb 70	Zn 65	Zr 40

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2831	4Na ₂ O.10WO ₃ .23H ₂ O.....	2982.33	M.	680.8	4.3	
2832	5Na ₂ O.12WO ₃ .28H ₂ O.....	3598.40	Tri.	705.8		
2833	9Na ₂ O.22WO ₃ .51H ₂ O.....	6580.73		683.3		
2834	Na ₂ O.3UO ₃	920.504	R. ?		6.912	
2835	NaU(C ₂ H ₃ O ₂) ₃	438.236	Tet.		2.56	109.1
2836	NaVO ₃	121.957	M. ?	562	2.79	
2837	Na ₂ O.V ₂ O ₅ .5V ₂ O ₅	1137.51	R. ?	ca. 800 d.		
2838	Na ₃ VO ₄	183.951		ca. 866		
2839	Na ₃ VO ₄ .10H ₂ O.....	364.105	C. H.			127, 263
2840	Na ₃ VO ₄ .12H ₂ O.....	400.136	Trig.			245
2841	Na ₄ V ₂ O ₇	305.908	H.	654		
2842	2Na ₂ VO ₄ .NaF.19H ₂ O.....	752.192	C.			123
2843	Na ₂ VSO ₃ .10H ₂ O.....	380.170		18	1.773	
2844	3Na ₂ O.V ₂ O ₅ .10WO ₃ .SiO ₂ .29H ₂ O.....	3270.41	C.		3.344	
2845	Na ₂ CbO ₃	187.094			4.19	
2846	Na ₂ O.B ₂ O ₃	131.634		966		
2847	Na ₂ O.2B ₂ O ₃	201.274		741	1. 2.5 glass	45
					2.37	
2848	Na ₂ B ₄ O ₇ .10H ₂ O—Borax.....	381.428	M.	75	1.73	460
2849	Na ₂ O.4B ₂ O ₃	340.554		783		
2850	NaAlO ₂	81.9570		1650		
2851	2NaF.AlF ₃ —Chiolite.....	167.954	Tet.		3.0	205
2852	3NaF.AlF ₃ —Cryolyte.....	209.950	M.	1000	2.90	427
					1. 2.10 ¹⁰⁸³	
2853	Na ₂ O.Al ₂ O ₃ .4SO ₃ .12H ₂ O—Tamarugite...	700.359	M. Tri.		2.03	494
2854	Na ₂ O.Al ₂ O ₃ .4SO ₃ .22H ₂ O—Mendozite...	880.513	M. ?		1.88	449
2855	Na ₂ SO ₄ .Al ₂ (SO ₄) ₃ .24H ₂ O.....	916.544	C.	61	1.675	72
2856	Na ₂ O.3Al ₂ O ₃ .4SO ₃ .6H ₂ O—Natroalunite...	796.106	Trig. C.		2.6	287
2857	Na ₂ O.Al ₂ O ₃ .P ₂ O ₅ .H ₂ O—Fremontite.....	323.977	M. ?		3.04	760
2858	Na ₂ O.2AlOF.As ₂ O ₃ —Durangite.....	396.834	M.		4.0	866
2859	Na ₂ O.Al ₂ O ₃ .2CO ₂ .2H ₂ O—Dawsonite.....	287.944	R.		2.4	653
2860	Na ₂ O.Al ₂ O ₃ .2SiO ₂ —Carnegieite.....	284.034	Tri. ?	1526	2.57	596
2861	Na ₂ O.Al ₂ O ₃ .2SiO ₂ —Nephelite.....	284.034	H.	Tr. 1248	2.67	266
2862	Na ₂ O.Al ₂ O ₃ .3SiO ₂ .2H ₂ O—Natrolite.....	380.125	R.		2.25	478
2863	Na ₂ O.Al ₂ O ₃ .4SiO ₂ —Jadeite.....	404.154	M.	1050	3.34	834
2864	Na ₂ O.Al ₂ O ₃ .4SiO ₂ .2H ₂ O—Analcite.....	440.185	C.		2.25	229
2865	Na ₂ O.Al ₂ O ₃ .6SiO ₂ —Albite.....	524.274	Tri.	1100	2.61	615
2866	Na ₂ O.Al ₂ O ₃ .9SiO ₂ .2NaF—Leifite.....	788.448	H.		2.57	248
2867	Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2H ₂ O—Paragonite.....	764.145	M.		2.8	750
2868	2Na ₂ O.Al ₂ O ₃ .6SiO ₂ .H ₂ O—Ussingite.....	604.283	Tri.		2.50	565
2869	2Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .7H ₂ O— Hydronephelite.....	916.216	H.		2.3	236
2870	3Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2NaCl—Sodalite.....	969.012	C.		2.2	99
2871	3Na ₂ O.3Al ₂ O ₃ .18SiO ₂ .2NaCl—Marialite...	1689.73	Tet.		2.56	261
2872	3Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2Na ₂ S—Lazurite...	1008.22	C.		2.4	108
2873	5Na ₂ O.3Al ₂ O ₃ .6SiO ₂ .2SO ₃ —Noselite.....	1136.22	C.		2.3	105
2874	Na ₂ La(NO ₃) ₆ .H ₂ O.....	512.959	M.		2.63 ₁	
2875	Na ₂ Ce(NO ₃) ₆ .H ₂ O.....	514.299			2.65 ₁	
2876	Na ₂ O.2BeO.P ₂ O ₅ —Beryllonite.....	254.082	R.		2.85	679
2877	Na ₂ O.2BeO.6SiO ₂ .H ₂ O—Epididymite.....	490.409	R.		3.55	700
2878	Na ₂ O.2BeO.6SiO ₂ .H ₂ O—Eudidymite.....	490.409	M.		2.55	657
2879	Na ₂ SO ₄ .MgSO ₄	262.444	R.		2.729	
2880	Na ₂ O.MgO.2SO ₃ .2.5H ₂ O—Loeweite.....	307.483	Trig.	Tr. 71	2.37	232
2881	Na ₂ O.MgO.2SO ₃ .4H ₂ O—Bloedite.....	334.506	M.		2.23	498
2882	3Na ₂ O.MgO.4SO ₃ —Vanthoffite.....	546.562	M. ?		2.69	497
2883	NaMgPO ₄	142.341			2.5	
2884	Na ₂ MgP ₂ O ₇	244.362	C. ?		2.2	
2885	Na ₂ Mg(CO ₃) ₂	190.314	Tet.		2.729 ¹⁵	
2886	NaCl.Na ₂ CO ₃ .MgCO ₃ —Northrupite.....	248.769	C.		2.377 ¹⁵	118
2887	3Na ₂ O.2MgO.4CO ₂ .SO ₃ —Tychite.....	522.687	C.		2.52	113
2889	Na ₂ O.CaO.2SO ₃ —Glauberite.....	278.194	M.		2.83	625
2890	Na ₂ O.CaO.2SO ₃ .4H ₂ O—Wattevillite.....	350.257	M.		1.81	446
2891	3Na ₂ O.3CaO.2P ₂ O ₅	638.288	M.		2.1	

Mg	Na	Al	Si	P	S	Cl	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Sr	Zr	Hf	Ta	Nb	Mo	Sn	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Y	Zr	Hf	Ta	Nb	Mo	Sn	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr							
78	11	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2893	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{CO}_2 \cdot 2\text{H}_2\text{O}$ —Pirssonite.....	242.095	R.	813	2.35	567
2894	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{CO}_2 \cdot 5\text{H}_2\text{O}$ —Gaylussite.....	296.141	M.		1.94	580
2895	$\text{Na}_2\text{O} \cdot 4\text{CaO} \cdot 6\text{SiO}_2 \cdot \text{H}_2\text{O}$ —Pectolite.....	664.650	M.		2.73	766
2896	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 5\text{B}_2\text{O}_3 \cdot 16\text{H}_2\text{O}$ —Ulexite.....	810.580	M.	d.	1.95	551
2897	$\text{NaF} \cdot \text{CaF}_2 \cdot \text{AlF}_3 \cdot \text{H}_2\text{O}$ —Pachnolite.....	222.042	M.		2.98	429
2898	$\text{NaF} \cdot \text{CaF}_2 \cdot \text{AlF}_3 \cdot \text{H}_2\text{O}$ —Thomsenolite.....	222.042	M.		2.98	430
2899	$\text{Na}_2\text{O} \cdot \text{CaO} \cdot 2\text{Al}_2\text{O}_3 \cdot 10\text{SiO}_2 \cdot 20\text{H}_2\text{O}$ — Faujasite.....	1282.81	C.		1.92	92
2900	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot 8\text{H}_2\text{O}$ — Mesolite.....	1164.56	Tri.		2.27	555
2901	$\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot 8\text{H}_2\text{O}$ — Pseudomesolite.....	1164.56	Tri.		2.22	531
2902	$5(\text{Na}_2, \text{Ca})\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{SO}_3$ — Haüynite.....		C.		2.4	106
2903	$\text{NaF} \cdot \text{CaO} \cdot \text{BeO} \cdot 2\text{SiO}_2$ —Leucophanite.....	243.207	R.		2.96	743
2904	$\text{NaF} \cdot 2\text{CaO} \cdot 2\text{BeO} \cdot 3\text{SiO}_2$ —Meliphanite.....	384.357	Tet.		3.01	297
2905	$\text{NaCaMgAlSi}_4\text{O}_{12}$ —Tuxtlite.....	418.587	M.		3.27	870
2906	Na_2SrSO_7	277.679		280		
2907	$\text{Na}_2\text{Sr}(\text{CO}_3)_2$	253.614		750		
2908	$\text{Na}_4\text{SrCa}(\text{CO}_3)_4$	459.678		720		
2909	$\text{Na}_2\text{Ba}(\text{CO}_3)_2$	303.364		740		
2910	$2\text{Na}_2\text{O} \cdot \text{BaO} \cdot 2\text{TiO}_2 \cdot 10\text{SiO}_2$ — Leucosphenite.....	1037.76	M.		3.1	849
2911	$\text{Na}_4\text{BaCa}(\text{CO}_3)_4$	509.428		660		
2912	$\text{NaLi}(dl\text{-C}_4\text{H}_4\text{O}_6) \cdot 2\text{H}_2\text{O}$	213.998	M.			506
2913	$3\text{NaF} \cdot 3\text{LiF} \cdot 2\text{AlF}_3$ —Cryolithionite.....	371.728	C.		2.78	67
2914	K_2O	94.1900			2.32	
2915	K_2O_4	142.190		>280		
2916	KH.....	40.1027		d.	0.80	
2917	KOH.....	56.1027		Tr. 260	2.044	
2918	KF.....	58.0950		380	1. 1.87 ₄ ³²⁰	
				880	2.48	
					1. 1.869 ₄ ⁹¹³	
2919	KF.2HF.....	98.1104		105		
2920	KF.3HF.....	118.118		100		
2921	KCl—Sylvite.....	74.5530	C.		1.98s	103
2922	KClO ₃	122.553	M.	368.4	2.32	579
2923	KClO ₄	138.553	R.	d. 400	2.52	
2924	KBr.....	119.011		730	2.75	134
2925	KBrO ₃	167.011	Trig.	370 d.	3.27 ^{17.5}	
2926	KI.....	166.027	C.	773	3.123	150
2927	KI ₃	419.891	M.	45	3.498	
2928	KIO ₃	214.027	M.	560	3.89	
2929	KIO ₄	230.027	Tet.	582	3.618	
2930	$\text{K}_2\text{H}_3\text{IO}_6 \cdot 3\text{H}_2\text{O}$	358.191	Tri.			541
2931	KICl ₂	236.943	M.	60		
2932	KIBr ₂	325.859	R.	60		
2933	K ₂ S.....	110.255		471	1.805	
				Tr. 146.4		
2934	$\text{K}_2\text{S} \cdot 5\text{H}_2\text{O}$	200.332		60		
2935	K ₂ S ₃	174.385		252.0		
2936	K ₂ S ₄	206.450		>145		
2937	K ₂ S ₅	238.515		206.0		
2938	K ₂ SO ₄ —Arcanite.....	174.255	R.	Tr. 588	2.662	519
				1067		
2939	K ₂ S ₂ O ₃	190.320	C.	d. 400		
2940	$\text{K}_2\text{S}_2\text{O}_5 \cdot 0.33\text{H}_2\text{O}$	196.325	M.		2.23	
2941	K ₂ S ₂ O ₆	238.320	Trig.		2.278	215
2942	K ₂ S ₂ O ₇	254.320		>300	2.277	
2943	K ₂ S ₂ O ₈	270.320	Tri.			458
2944	K ₂ S ₃ O ₆	270.385	R.		2.304	472
2945	K ₂ S ₄ O ₆	302.450	M.		2.296	
2946	$\text{K}_2\text{S}_5\text{O}_6 \cdot 1.5\text{H}_2\text{O}$	361.538			2.112	

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	83	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2947	KSH.....	72.1677		455		
2948	KHSO ₄ —Misenite.....	136.168	R. M.	210	2.35	
2949	KHSO ₇	216.233		168		
2950	K ₂ SO ₄ .KHSO ₄	310.423	M.		2.59 ¹⁸	508
2951	4K ₂ SO ₄ .3H ₂ SO ₄	991.261		d. <25	2.277 ¹⁸	
2952	KSO ₃ F.....	138.160		311		
2953	KI.4SO ₂	422.287		0.26		
2954	K ₂ Se.....	157.390			2.851	
2955	K ₂ SeO ₄	221.390	R.		3.066	646
2956	K ₂ SeSO ₇	301.455		120		
2957	K ₂ H ₂ TeI ₂ O ₁₀ .2H ₂ O.....	657.600	Trig.			397
2958	KNO ₃	85.1030		297	1.915	
2959	KNO ₃ —Niter.....	101.103	R. Trig.	Tr. 129 R. to Trig.	2.11 ^{10.6}	556
				33s		
2960	KNH ₂	55.1184		338		
2961	KNO ₃ .2HNO ₃	227.134		22		
2962	KBr.4NH ₃	187.135		45		
2963	KNO ₃ .KHSO ₄	237.271			2.38	
2964	5K ₂ O.(NH ₄) ₂ O.6SO ₃ —Taylorite.....	1003.42				440
2965	KPO ₃	118.119		Tr. 450	2.258 ^{14.6}	
				810	1.2.068 ⁹⁰⁰	
2966	K ₃ PO ₄	212.309		1340		
2967	K ₄ P ₂ O ₇	330.428		Tr. 278	2.33	
				1090		
2968	KH ₂ PO ₄	136.134	Tet.	96	2.338	244
2969	K ₂ H ₂ P ₂ O ₆ .2H ₂ O.....	274.284	M.	d.		624
2970	K ₂ H ₂ P ₂ O ₆ .3H ₂ O.....	292.300	R.	d.		483
2971	KH ₂ AsO ₄	180.070	Tet.	288	2.867	278
2972	5K ₂ O.As ₂ O ₃ .8SO ₃ .6H ₂ O.....	1449.48			2.289	
2973	KSb.....	160.865		605		
2974	K ₂ Sb.....	239.055		812		
2975	K ₂ CO ₃	138.190		891	2.29	
2976	(KCO ₃) ₂	134.190		78		
2977	K ₂ C ₂ O ₄ .H ₂ O.....	184.205	M.		2.13	486
2978	K ₂ O.2CO ₂ .H ₂ O—Kalicinite.....	200.205	M.	d. <200	2.17	476
2979	2K ₂ CO ₃ .3H ₂ O.....	330.426	M.		2.043	
2980	KCHO ₂	84.1027		167.5	1.91	
2981	KHC ₂ O ₄	128.103	M.		2.0	655
2982	KHC ₂ O ₄ .H ₂ O.....	146.118			2.044	
2983	KC ₂ H ₃ O ₃	98.1181		292	1.8	
2984	KC ₂ H ₃ O ₄ —Acid succinate.....	156.134	M.	242 d.	1.767	
2985	KC ₂ H ₃ O ₄ .2H ₂ O—Acid succinate.....	192.164	R.		1.616	617
2986	KH(<i>d</i> -C ₄ H ₄ O ₆).....	188.134	R.		1.956	
2987	KH(<i>dl</i> -C ₄ H ₄ O ₆).....	188.134	M.		1.954	
2988	KH(C ₂ H ₃ O ₂) ₂	158.149		142		
2989	KC ₂ H ₃ O ₇ —Citrate.....	230.149	Tri.		1.906	
2990	KC ₂ H ₃ O ₂ .2C ₂ H ₃ O ₂	218.180		112	1.47	
2991	KHC ₈ H ₄ O ₄ —Acid phthalate.....	204.134	R.		1.636	
2992	KH(C ₂ H ₃ O ₄) ₂ —Disuccinate.....	274.180	M.	162	1.56	
2993	KC ₂ H ₃ O ₄ .2H ₂ O—Acetylsalicylate.....	254.180		65		
2994	KC ₁₈ H ₃₃ O ₂ —Oleate.....	320.349				1037
2995	K ₂ C ₄ H ₄ O ₄ .3H ₂ O—Succinate.....	248.267	R.		1.564	
2996	K ₂ (<i>d</i> , <i>l</i> -C ₄ H ₄ O ₆).....	226.221	M.		1.984	
2997	K ₂ (<i>d</i> -C ₄ H ₄ O ₆).0.5H ₂ O.....	235.229	M.		1.98	610
2998	2K ₂ C ₂ O ₄ .H ₂ C ₂ O ₄ .2H ₂ O—Tetraoxalate.....	458.426	R.		1.213 ²²	592
2999	KH(CCl ₃ CO ₂) ₂	364.851	Tet.		2.005 ¹⁸	
3000	KC ₂ H ₃ O ₄ S—Ethyl sulfate.....	164.199	M.		1.843	
3001	KC ₂ H ₃ O ₄ S— <i>p</i> -Phenolsulfonate.....	212.199	R.	>260	1.87	770
3002	KC ₂ H ₃ O ₄ S.2H ₂ O— <i>o</i> -Phenolsulfonate.....	248.229	R.		1.734	697
3003	KC ₂ H ₃ O ₄ S ₂ .H ₂ O—2, 4-Phenoldisulfonate.....	309.271	R.			768
3004	CH ₂ (SO ₂ K) ₂ —Methane disulfonate.....	252.335	M.		2.376	645
3005	K ₂ C ₁₀ H ₆ O ₂ S ₂ .2H ₂ O—Naphthalene 1, 5-disulfonate.....	336.397	M.		1.797	859

Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Pb	Bi	Po	At	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																													
7	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.																												
3006	KCN.....	65.1030		634.5	1.52 ^{1a}																													
3007	KCNO.....	81.1030			2.048																													
3008	KNH ₄ (<i>d</i> -C ₆ H ₄ O ₆).0.5H ₂ O.....	214.172			1.700																													
3009	KC ₆ H ₂ N ₄ O ₆ —Acid uroxsate.....	253.142				1038																												
3010	KC ₆ H ₂ O ₇ N ₄ —Picrate.....	267.134	R.		1.852	982																												
3011	KCNS.....	97.1680		173.2	1.886																													
3012	K(SbO)(<i>d</i> -C ₆ H ₄ O ₆).0.5H ₂ O—T a r t a r emetic.....	333.904	R.		2.607	810																												
3013	K ₂ O.SiO ₂	154.250		976																														
3014	K ₂ O.2SiO ₂	214.310	R. ?	1041		532																												
3015	K ₂ O.4SiO ₂ .H ₂ O.....	352.445	R.	d. 400	2.417	634																												
3016	K ₂ SiF ₆ —Hieratite.....	220.250	C.		2.665																													
3017	K ₂ Ti ₂ O ₆	253.990		980																														
3017.5	K ₂ ZrF ₆	283.190	M.			1037.2																												
3017.6	K ₂ ZrF ₇	341.285	C.			68.2																												
3018	K ₂ Sn(OH) ₆	298.936	Trig.		3.197																													
3019	K ₂ SnCl ₆	409.638	C.		2.71	147																												
3020	K ₂ SnBr ₆	676.386			3.783																													
3021	K ₂ SnS ₃ .3H ₂ O.....	347.131			1.847 ^{1a}																													
3022	KPb ₂ Cl ₆	630.785	R.	440																														
3023	K ₂ PbCl ₆	498.138	C.	d. 190																														
3024	KC ₂ H ₃ O ₂ .PbI(C ₂ H ₃ O ₂).....	491.273		208.5																														
3025	KGa(SO ₄) ₂ .12H ₂ O.....	517.130	C.		1.895	86																												
3026	K ₃ InCl ₆ .2H ₂ O.....	480.864	Tet.		2.483																													
3027	K ₃ InBr ₆ .2H ₂ O.....	747.612	Tet.		3.140																													
3028	K ₃ TlCl ₆ .2H ₂ O.....	570.464	Tet.		2.859																													
3029	K ₂ SO ₄ .ZnSO ₄ .6H ₂ O.....	443.792	M.	d. 121	2.24 ⁵	482																												
3030	K ₂ Zn(SeO ₄) ₂ .2H ₂ O.....	466.001	Tri.		3.21																													
3031	K ₂ Zn(SeO ₄) ₂ .6H ₂ O.....	538.062	M.		2.554	588																												
3032	K ₂ Zn(CN) ₄	247.602	C.	d. 150		70																												
3033	4KCl.CdCl ₂	481.538	Trig.		2.5	293																												
3034	K ₂ Cd(NO ₃) ₄	374.632	R.			691																												
3035	CdKPO ₄	246.529	R.		3.8																													
3036	KCl.2HgCl ₂ .2H ₂ O.....	653.636	R.		4.11 ^{1a}																													
3037	2KCl.HgCl ₂ .H ₂ O.....	438.647	R.		3.58 ^{1a}	877																												
3038	KBr.HgBr ₂	479.453			4.40																													
3039	KBr.HgBr ₂ .H ₂ O.....	497.468			3.865																													
3040	KI.HgI ₂ .H ₂ O.....	638.516		104																														
3041	2KCN.Hg(CN) ₂	382.832	Tet.		2.447 ^{11.3}																													
3042	2KCl.CuCl ₂ .2H ₂ O.....	319.623	Tet.		2.41	312																												
3043	K ₂ O.CuO.2SO ₃ .6H ₂ O—Cyanochroite.....	441.982	M.		2.22	491																												
3045	K ₂ SeO ₄ .CuSeO ₄ .6H ₂ O.....	536.252	M.		2.527	603																												
3046	K ₂ CO ₃ .CuCO ₃	261.760			1.35 ^{6a}																													
3047	K ₂ Cu(CN) ₄	284.887	Trig.			121																												
3048	KNO ₃ .AgNO ₃	270.991	M.	125	3.219																													
3049	2KNO ₃ .AgNO ₃ .Bi(NO ₃) ₃	671.118			3.33																													
3050	KAgCO ₃	206.975		d.	3.769																													
3051	KAuCl ₄	378.127	M.	357																														
3052	K ₂ Os(CN) ₆ .3H ₂ O.....	557.274	M.			769																												
3053	K ₂ IrCl ₆	484.038	C.	d.	3.546																													
3054	K ₂ SO ₄ .Ir ₂ (SO ₄) ₃ .24H ₂ O.....	1281.02	C.	103																														
3055	K ₃ Ir(C ₂ O ₄) ₃ .4H ₂ O.....	646.447	Tri.		2.510 ^{1a}																													
3056	K ₃ IrCl ₂ (C ₂ O ₄) ₂ .H ₂ O—Chloroxalate.....	615.316	M.			736																												
3057	K ₃ IrCl ₂ (NO ₂) ₂ .C ₂ O ₄ .2H ₂ O—Dichloro dini- tro oxalate.....	597.348	R.			716																												
3058	K ₂ PtCl ₄	415.252	Tet.		3.30																													
3059	K ₂ PtCl ₆	486.168	C.	d. 250	3.499																													
3060	K ₂ PtBr ₆	752.916	C.	>400 d.	4.66																													
3061	K ₂ PtI ₆	1035.01	C.		5.18																													
3062	K ₂ S.3PtS.PtS ₂	1051.50		d.	6.44 ^{1a}																													
3063	[Pt(NH ₃)Cl ₃]K.H ₂ O.....	375.746	R.			709																												
3064	K ₂ Pt(NO ₂) ₂ Br ₂ .H ₂ O.....	543.283	Tri.			858																												
3065	K ₂ Pt(NO ₂) ₂ I ₂ .2H ₂ O.....	655.331	Tet.			882																												
Ag 32	Al 55	As 13	Au 33	B 84	Be 79	Bi 75	Br 15	C 16	Ca 77	Cd 61	Ce 59	Cl 44	Co 46	Cr 85	Cu 81	Dy 67	Er 69	Eu 64	F 9	Fe 43	Ga 25	Gd 65	Ge 30	Gh 75	H 1	Hf 73	Hg 80	I 63	In 6	Ir 26	K 39	La 58	Li 3	Lu 72

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3066	$K_2Pt(C_2O_4)_2 \cdot 2H_2O$	485.451	M.		3.03	
3067	$K_2Pt(CN)_4$	377.452	R.		2.45	
3068	$K_2Pt(NO_2)_2C_2O_4 \cdot H_2O$	471.451	M.			817
3069	$K_2Pt(SCN)_6$	621.858	H.		3.70 ¹⁹	
3070	$K_2Pt(SCN)_6 \cdot 2H_2O$	657.889	M. R.		2.342 ¹⁸	
3071	$K_2Pt(SeCN)_6$	904.668	R.	d. 80	3.378 ^{12.5}	
3072	$KRuO_4 \cdot H_2O$	222.810	Tet.	d. 400 vac.		
3073	$K_4Ru(CN)_6 \cdot 3H_2O$	468.174	M.			722
3074	$K_3Rh(CN)_6$	376.243	M.			669
3075	K_2PdCl_4	326.722			2.67	
3076	K_2PdCl_6	397.638	C.		2.738	
3077	$KMnO_4$	158.025	R.	d. <240	2.703	291
3078	$K_2MnCl_4 \cdot 2H_2O$	310.983	Tri.		2.221	
3079	K_4MnCl_6 —Chloromanganokalite	424.058	Trig.		2.31	
3080	$K_2SO_4 \cdot MnSeO_4 \cdot 2H_2O$	408.416	Tri.		3.07	
3081	$K_3Mn(CN)_6$	328.695	M.			1055
3082	$K_2Fe(SO_4)_2$	326.160			2.177	
3083	$K_2Fe(SO_4)_2 \cdot 6H_2O$	434.252	M.		2.169	479
3084	$K_2Fe_2(SO_4)_4 \cdot 24H_2O$	1006.50	C.	33	1.831	97
3085	$K_2O \cdot 3Fe_2O_3 \cdot 4SO_3 \cdot 6H_2O$ —Jarosite	1001.58	R.		3.2	370
3086	$K_2Fe_2(CrO_4)_4 \cdot 6H_2O$	806.342	M.		1.448 ^{17.5}	678
3087	$K_2Fe(CN)_6$	329.173	M.		1.894 ¹⁷	699
3088	$K_4Fe(CN)_6$	368.268			1.898 ¹⁷	
3089	$K_4Fe(CN)_6 \cdot 3H_2O$	422.314	M.			714
3090	$2KF \cdot CoF_2$	213.160	M.		3.22	
3091	$K_2SO_4 \cdot CoSO_4 \cdot 6H_2O$	437.382	M.		2.218	492
3092	$K_2SeO_4 \cdot CoSeO_4 \cdot 6H_2O$	531.652	M.		2.514	589
3093	$[Co(NH_3)_2(NO_2)_4]K$	316.159	R.		2.076	
3094	$K_2Co(C_2H_3O_4)_2$ —Malonate	341.191			2.234	
3095	$K_3Co(CN)_6$	332.303	M.		1.906	
3096	$K_2SO_4 \cdot NiSO_4 \cdot 6H_2O$	437.102	M.	d. <100	2.237	514
3097	$K_2Ni(SeO_4)_2 \cdot 6H_2O$	531.372	M.	d. <100	2.539	608
3098	$K_2Ni(COS)_4$	377.140	M.		2.132 ^{18.4}	125
3099	$2KCN \cdot Ni(CN)_2 \cdot H_2O$	258.927	M.		1.871 ^{14.5}	
3100	$K_2O \cdot CrO_2$ —Tarapacaite	194.200	R.	97.5	2.732 ¹⁸	927
3101	$K_2Cr_2O_7$	294.210	Tri.	398	2.69	924
3102	$K_2Cr_2O_{10}$	394.220	M.	250	2.648	
3103	$K_2Cr_2O_{13}$	494.230	M.	215	2.649	
3104	$KCrClO_4$	174.563	M.	d.	2.497 ²⁹	
3105	$K_4O \cdot 2CrO_3 \cdot I_2O_5$	628.074			3.66	
3106	K_2CrSO_7	274.265		350		
3107	$K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$	998.840	C.		1.83	95
3108	K_3CrSeO_7	321.400		120		
3109	$3K_2CrO_4 \cdot 2(NH_4)_2CrO_4$	886.775			2.403 ¹⁸	
3110	$K_2O \cdot Cr_2O_3 \cdot 2P_2O_5$	530.306	M.		3.5 ²⁰	
3111	$K_3Cr(CN)_6$	325.343	M.	150 d.	1.71	607
3112	$K_3Cr(SCN)_6 \cdot 4H_2O$	589.795	R.		1.711 ¹⁶	
3113	$K_2Cr_2O_7 \cdot HgCl_2$	565.736	R.		3.531 ¹¹	
3114	$K_2Cr_2O_7 \cdot Hg(CN)_2 \cdot 2H_2O$	582.867	R.			1077
3115	K_2MoO_4	238.190		919	l. 2.342 ⁹⁶⁴	
3116	K_2WO_4	326.190	M.	921	3.120 ⁹⁹¹	
				Tr. 388		
				555		
3117	$K_3W_2O_7$	558.190				
3118	$K_2O \cdot 8WO_3$	1950.19			6.53	
3119	$K_2SeO_4 \cdot Cr_2(SeO_4)_3 \cdot 24H_2O$	1187.38			2.078 ^{17.5}	
3120	$K_4U(C_2O_4)_4 \cdot 5H_2O$	772.627			2.563	
3121	$KUO_2(C_2H_3O_2)_2 \cdot H_2O$	504.350	M.		2.396	
3122	$KV(SO_4)_2 \cdot 12H_2O$	498.370	Tet.		1.782	
3123	$K_4V_3S_4O_{13} \cdot 3H_2O$	520.736			2.144	
3124	$K_2O \cdot 2UO_3 \cdot V_2O_5 \cdot 8H_2O$ —Carnotite	960.573	H. R.			988
3125	$3K_2O \cdot SiO_2 \cdot V_2O_5 \cdot 10WO_3 \cdot 22H_2O$	3240.89	C.		3.664	
3126	$7K_2O \cdot 2SiO_2 \cdot 3V_2O_5 \cdot 18WO_3 \cdot 42H_2O$	6257.86	M. Tri.		3.537	
3127	$NH_4K_2O_8 \cdot SiO_2 \cdot V_2O_5 \cdot 10WO_3 \cdot 23H_2O$	3237.85			3.74	

Mg Mn Fe Co Ni Cu Zn Al Si P S Cl K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Pb Bi Po At Ra Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3128	2KF.TaF ₅	392.690	R.		4.56	
3129	K ₂ O.B ₂ O ₃	163.830	M.	947		
3130	KBF ₄	125.915	C. R.	500 d.	2.50	
3131	KBO ₂ .KPO ₃	200.034		872		
3132	3KF.AlF ₃	258.245		1035 Tr. 300		
3133	K ₂ O.Al ₂ O ₃ .4SO ₃ .24H ₂ O—Kalinite.....	948.740	M. C.		1.75	77, 442
3134	K ₂ O.3Al ₂ O ₃ .4SO ₃ .6H ₂ O—Alunite.....	828.302	Trig.		2.60	281
3135	KAl(SeO ₄) ₂ .12H ₂ O.....	568.640	C.		2.001	93
3136	K ₂ O.Al ₂ O ₃ .2SiO ₂ —Kaliophilite.....	316.230	H.	>1745	2.6	258
3137	K ₂ O.Al ₂ O ₃ .4SiO ₂ —Leucite.....	436.350		>1800	2.47	114
3138	K ₂ O.Al ₂ O ₃ .6SiO ₂ —Microcline.....	556.470	Tri.	1150	2.56	613
3139	K ₂ O.Al ₂ O ₃ .6SiO ₂ —Orthoclase.....	556.470	M.	1170 d.	2.56	606
3140	K ₂ O.3Al ₂ O ₃ .6SiO ₂ .2H ₂ O—Muscovite.....	796.341	M.	d.	2.9	731
3141	2Al ₂ O ₃ .3B ₂ O ₃ .K ₂ O—Rhodizite.....	506.950	C.		3.4	151
3142	K ₂ La(NO ₃) ₆ .1.5H ₂ O.....	554.163	R.	d. 60	2.54 ⁰	
3143	K ₂ Ce(NO ₃) ₆ .2H ₂ O.....	564.511	R.	d. 180		
3143.5	K ₂ HfF ₆	371.19	M.			1037.1
3143.6	K ₂ HfF ₇	429.285	C.			68.1
3144	KMgF ₃	120.415			2.8	
3145	K ₂ MgF ₄	178.510			2.7	
3146	KCl.MgCl ₂ .6H ₂ O—Carnallite.....	277.881	R.	167	1.60	467
3147	KI.MgI ₂ .6H ₂ O.....	552.303			2.547	
3148	K ₂ SO ₄ .MgSO ₄ .4H ₂ O—Leonite.....	366.702	M.		2.25	493
3149	K ₂ O.MgO.2SO ₃ .6H ₂ O—Picromerite.....	402.732	M.	d. 72	2.15	451
3150	K ₂ SO ₄ .2MgSO ₄ —Langbeinite.....	415.025	C.		2.83	128
3151	KCl.MgSO ₄ .3H ₂ O—Kainite.....	248.984	M.		2.13	553
3152	K ₂ Mg(SeO ₄) ₂ .6H ₂ O.....	497.002	M.		2.34	527
3153	KMgPO ₄	158.439	R.		2.6	
3154	K ₂ Mg(P ₂ O ₇) ₂	576.654	M.		2.4	
3155	KHMg(CO ₃) ₂ .4H ₂ O.....	256.484	Tri.	d. 100	1.98	
3156	K ₂ Mg(CrO ₄) ₂ .2H ₂ O.....	370.561	Tri.		2.60 ¹⁶	
3157	K ₂ O.4MgO.11B ₂ O ₃ .18H ₂ O—Heintzeite.....	1345.79	M.		2.1	611
3158	KCl.CaCl ₂ —Chlorocalcite.....	185.539	C.	754		591
3159	K ₂ O.CaO.2SO ₃ .H ₂ O—Synnenite.....	289.310	M.		2.60	581
3160	K ₂ CaP ₂ O ₇	292.308	H.		2.7	
3161	K ₂ Ca(CO ₃) ₂	238.260	R.	790		
3162	K ₂ O.8CaO.16SiO ₂ .16H ₂ O—Apophyllite.....	1791.96	C.		2.35	259
3163	K ₂ CrO ₄ .CaCrO ₄ .2H ₂ O.....	386.311	Tri.		2.502	
3164	K ₂ O.4CaO.2Al ₂ O ₃ .24SiO ₂ .H ₂ O—Milarite.....	1981.77	H.		2.57	254
3165	K ₂ O.2CaO.MgO.4SO ₃ .2H ₂ O—Polyhalite.....	602.941	R.		2.78	685
3166	K ₂ SO ₄ .4CaSO ₄ .MgSO ₄ .2H ₂ O—Krugite.....	875.211			2.801	
3167	KCl.2SrCl ₂	391.625		638		
3168	2KCl.SrCl ₂	307.642	R.	597		
3169	K ₂ SrP ₂ O ₇	339.858	H.		2.9	
3170	KSrCr(C ₂ O ₄) ₂ .6H ₂ O.....	550.817			2.155 ^{12,8}	
3171	K ₂ Ba(CO ₃) ₂	335.560		800		
3172	K ₄ BaCa(CO ₃) ₄	573.820		758		
3173	LiKSO ₄	142.099	H.		2.393	218
3174	2KNO ₃ .LiNO ₂ .Bi(NO ₃) ₃	570.177			3.21 ¹⁵	
3175	LiKCO ₃	106.034		515		
3176	LiK(dl-C ₄ H ₄ O ₆).H ₂ O.....	212.080	R.			601
3177	KLi(dl-C ₄ H ₄ O ₆).H ₂ O.....	212.080	M.		1.610	1075
3178	KLiPt(CN) ₄ .3H ₂ O.....	399.342	R.			798
3179	K ₂ Li ₂ Fe(CN) ₆ .3H ₂ O.....	358.002	M.			753
3180	KLiMoO ₄ .H ₂ O.....	224.049	R.		2.696	
3181	K ₂ Na(SO ₄) ₂ —Glaserite.....	332.412	Trig.	<1000	2.696	237
3182	KNaHAsO ₄ .7H ₂ O.....	328.168			1.884	
3183	KNa(dl-C ₄ H ₄ O ₆).3H ₂ O.....	264.169	M.		1.783	
3184	KNaC ₄ H ₄ O ₆ .4H ₂ O—Rochelle salt.....	282.184	R.		1.790	517
3185	KCl.11Na ₂ O.9SO ₃ .2CO ₂ —Hanksite.....	1565.07	H.		2.56	222
3186	3KCl.NaCl.FeCl ₃ —Rinneite.....	408.870	Trig.		2.35	290
3187	K ₂ Na(CrO ₄) ₂	372.302	Trig.		2.767	351

Ag	Al	As	Au	B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cu	Dy	Er	Eu	F	Fe	Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu
32	55	13	33	54	79	75	15	5	16	77	51	29	59	4	44	46	31	67	69	64	3	43	25	65	20	75	2	73	30	68	6	26	36	53	58	81	72

Index No.	Formula	Mol. wt.	Crystal system	M. P	d_1^{20}	Ref. ind. finding No.
3188	$5K_2W_2O_{12} \cdot 2Na_2W_2O_{12}$	7534.93			7.117	
3189	$(CaK_2Na_2)O \cdot Al_2O_3 \cdot 6SiO_2 \cdot 6H_2O$ — Eronite		R.		2.0	435
3190	Rb_2O	186.880		d. 400	3.72	
3191	Rb_2O_2	202.880			3.65	
3192	Rb_2O_3	218.880			3.53	
3193	Rb_2O_4	234.880		280	3.05 ⁹	
3194	RbH	86.4477		d. 300	2	
3195	$RbOH$	102.448		300	3.203 ¹¹	
3196	RbF	104.440		760	1.2.88 ¹²⁰	
3197	$RbCl$	120.898		715	2.76	104
					1.2.088 ⁷⁴⁰	
3198	$RbClO_3$	168.898			3.19	
3199	$RbClO_4$	184.898	R.		2.9	
3200	$RbBr$	165.356	C.	682	3.35	133
					1.2.795 ⁷³⁰	
3201	$RbBr_3$	325.188	R.	d. 140		
3202	$RbBrO_3$	213.356		430	3.68	
3203	$RbBrCl_2$	236.272	R.	d. 110		
3204	$RbBr_2Cl$	280.730	R.	76		
3205	RbI	212.372	C.	642	3.55	146
					1.2.873 ⁷²³	
3206	RbI_3	466.236	R.	190		
3207	$RbIO_3$	260.372	M. ?, C.	d.	4.33 ^{19.5}	
3208	$RbIO_4$	276.372	Tet.		3.918 ¹⁶	
3209	$RbICl_2$	283.288	R.	190		
3210	$RbIBr_2$	372.204	R.	225		
3211	$RbIBrCl$	327.746	R.	205		
3212	Rb_2S	202.945			2.912	
3213	Rb_2S_3	267.075		213		
3214	Rb_2S_4	331.205		225	2.618 ¹⁶	
3215	Rb_2SO_4	266.945	R.	1060	3.613	576
				Tr. 653	1.2.529 ¹¹⁰⁰	
3216	$Rb_2S_2O_6$	331.010	H.			217
3217	$Rb_2S_2O_8$	363.010	M.			502
3218	$RbHSO_4$	182.513			2.892 ¹⁶	
3219	RbI_4SO_3	468.632		13.5		
3220	Rb_2SeO_4	314.080	R.		3.90	673
3221	$RbNO_3$	147.448	H.	Tr. 161.4 to C.	3.11	594
			C.	Tr. 219 to R.	1.2.395 ⁴⁰⁰	
3222	$RbNO_3 \cdot HNO_3$	210.464	R. Tri.	310		
3223	$RbNO_3 \cdot 2HNO_3$	273.479	Tet.	62		
3224	Rb_2CO_3	230.880		45		
3225	$RbH_2(C_2O_4)_2 \cdot 2H_2O$	300.494		837		
3226	$Rb(dl-C_4H_4O_6)$	234.479	Tri.		2.125 ¹⁸	
3227	$Rb(meso-C_4H_4O_6) \cdot 0.5H_2O$	243.486	Tri.		2.282	
3228	$RbHC_8H_4O_4$ —Phthalate	250.479	Tri.		2.399	
3229	$Rb_2(d-C_4H_4O_6)$	318.911	R.		1.933	
3230	$Rb_2(meso-C_4H_4O_6) \cdot H_2O$	336.926	Trig.		2.692	
3231	$Rb_2(meso-C_4H_4O_6) \cdot 2H_2O$	354.942	Tri.		2.584	569
3232	$Rb_2C_6H_8O_7$ —Citrate	360.926	M.			496
3233	$RbH(CCl_3CO_2)_2$	411.196		212 d.		
3234	$RbSCN$	143.513			2.150 ¹⁸	
3235	Rb_2SiF_6	312.940		195		
3236	$RbTi(SO_4)_3 \cdot 12H_2O$	541.655	C.		3.332	199
3237	$RbPbCl_3$	399.014	R.	440		
3238	$RbPb_2Cl_5$	677.130	R.	423		
3239	$RbGa(SO_4)_3 \cdot 12H_2O$	563.475	C.		1.962	87
3240	$Rb_2InCl_6 \cdot H_2O$	480.985	R.		3.087	
3241	$Rb_2InBr_6 \cdot H_2O$	703.275			3.409	
3242	$RbIn(SO_4)_3 \cdot 12H_2O$	608.555	C.	42	2.065	83
3243	$Rb_2TiCl_6 \cdot H_2O$	570.585			3.513	

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Sa Sb Sc Se Si Sn Str Ta Tb Tc Th Ti Tl Tm U V W Y Yb Zn Zr
 78 42 47 11 82 61 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3244	Rb ₂ TlBr ₄ ·2H ₂ O	976.247			4.077	
3245	Rb ₂ Zn(SO ₄) ₂ ·6H ₂ O	536.482	M.		2.591	499
3246	Rb ₂ Zn(SeO ₄) ₂ ·6H ₂ O	630.752	M.		2.860	598
3247	Rb ₂ Cd(SO ₄) ₂ ·6H ₂ O	583.512			2.695	485
3248	2RbCl·CuCl ₂ ·2H ₂ O	412.313			2.895	
3249	Rb ₂ Cu(SO ₄) ₂ ·6H ₂ O	534.672	M.		2.57	510
3250	Rb ₂ AgBi(NO ₃) ₄	763.808			3.67 ¹⁵	
3251	Rb ₂ SO ₄ ·Ir ₂ (SO ₄) ₃ ·24H ₂ O	1373.71	C.	109		
3253	RbRh(SO ₄) ₂ ·12H ₂ O	596.665	C.			109
3254	RbMnO ₄	204.370			3.235 ^{10,4}	
3255	Rb ₂ Mn(SO ₄) ₂ ·6H ₂ O	526.032	M.		2.46	474
3256	RbFeCl ₄ ·2H ₂ O	283.685			2.711	
3257	Rb ₂ FeCl ₄ ·2H ₂ O	404.583			2.850	
3258	Rb ₂ Fe(SO ₄) ₂ ·6H ₂ O	526.942	M.		2.518	495
3259	RbFe(SO ₄) ₂ ·12H ₂ O	549.595	C.		1.92	98
3260	Rb ₂ FeSe ₂ O ₈ ·6H ₂ O	621.212			2.819	
3261	Rb ₂ SeO ₄ ·Fe ₂ (SeO ₄) ₃ ·24H ₂ O	1287.73	C.	45	2.131 ¹⁵	111
3262	Rb ₂ Co(SO ₄) ₂ ·6H ₂ O	530.072	M.		2.567	515
3263	Rb ₂ Co(C ₂ H ₃ O ₄) ₂ ·4H ₂ O—Malonate	505.942			2.131	
3264	Rb ₂ SO ₄ ·NiSO ₄ ·6H ₂ O	529.792	M.		2.586	523
3265	Rb ₂ SO ₄ ·Cr ₂ (SO ₄) ₃ ·24H ₂ O	1091.53	C.	107	1.946	96
3266	RbV(SO ₄) ₂ ·12H ₂ O	544.715			1.915 ⁴	
3267	3RbF·AlF ₃	397.280		985		
3268	Rb ₂ SO ₄ ·Al ₂ (SO ₄) ₃ ·24H ₂ O	1041.43	C.		1.867 ^o	78
3269	Rb ₂ La(NO ₃) ₆ ·4H ₂ O	691.892	M.	86	2.497 ^o	
3270	Rb ₂ Ce(NO ₃) ₆ ·4H ₂ O	693.232	M.	70	2.497 ^o	
3271	Rb ₂ Pr(NO ₃) ₆ ·4H ₂ O	693.902		63.5	2.50 ^o	
3272	Rb ₂ Nd(NO ₃) ₆ ·4H ₂ O	697.252		47	2.56 ^o	
3273	Rb ₂ Mg(SO ₄) ₂ ·6H ₂ O	495.422	M.		2.40	461
3274	Rb ₂ Mg(SeO ₄) ₂ ·6H ₂ O	589.692	M.		2.684	549
3275	Rb ₂ Mg(CrO ₄) ₂ ·6H ₂ O	535.312	M.		2.466	805
3276	RbLi(<i>d</i> -C ₄ H ₄ O ₄)·H ₂ O	258.425	R.		2.281	671
3277	RbNa(<i>meso</i> -C ₄ H ₄ O ₄)·2.5H ₂ O	301.506	Tri.		2.20	
3278	Cs ₂ O	281.620			4.36	
3279	Cs ₂ O ₂	313.620		400	4.25 ^o	
3280	Cs ₂ O ₄	329.620		60 ^o 515 (in O ₂)	3.68 ^o 2.7	
3281	CsH	133.818				
3282	CsOH	149.818		Tr. 223 272.3	3.675 3.586 ⁷⁵⁰	
3283	CsF	151.810		683	1.2.549 1.2.732 ⁷⁰⁰	
3284	CsCl	168.268	C.	646	3.97 3.57 ^{19,5}	144
3285	CsClO ₃	216.268			3.327	
3286	CsClO ₄	232.268			4.44	
3287	CsBr	212.726	C.	636	1.3.038 ⁷⁰⁰	152
3288	CsBr ₃	372.558				
3289	CsBrO ₃	260.726		180 420	4.10 ^{19,5}	
3290	CsBrCl ₂	283.642		205		
3291	CsBr ₂ Cl	328.100		191		
3292	CsI	259.742	C.	621	4.51 1.3.114 ⁴⁰⁰	163
3293	CsI ₃	513.606	R.	207.5		
3294	CsIO ₃	307.742	M.		4.85	
3295	CsIO ₄	323.742	R.		4.259	
3296	CsICl ₂	330.658	R.	230	3.86	
3297	CsIBr ₂	419.574		248		
3298	CsI ₂ Br	466.590		195.5		
3299	CsIBrCl	375.116		235		
3300	Cs ₂ S ₂	329.750		460		
3301	Cs ₂ S ₄	361.815		217		

Ag 32
Al 55
As 13
Au 33B 54
Ba 79
Be 75
Bi 15
Br 5C 16
Ca 77
Cb 51
Cd 29
Ce 59Cl 4
Co 44
Cr 46
Cu 85
Zn 3Dy 67
Er 90
Eu 64
F 3
Fe 43Ga 25
Gd 65
Ge 20
Gh 75
H 2Hf 73
Hg 30
Ho 68
I 6
In 26Ir 36
K 83
La 58
Li 81
Lu 73

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3302	Cs ₂ S ₄	393.880		160		
3303	Cs ₂ S ₅	425.945		210	2.806 ¹⁶	
3304	Cs ₂ S ₆	458.010		186		
3305	Cs ₂ SO ₄	361.685	R.	Tr. 660 to H. 1010	4.243 1.3.034 ¹⁰⁴⁰	687
3306	CsHSO ₄	229.883	R.	d.	3.352 ¹⁶	
3307	Cs ₂ SeO ₄	408.820	R.			752
3308	Cs ₂ (SeO ₄) ₂	552.020	R.		4.453	
3309	CsN ₃	174.834		315		
3310	CsNO ₃	194.818	H.	Tr. 161 to C. 414	3.685 1.2.713 ¹⁰⁰	
3311	CsNH ₂	148.833		260		
3312	CsNO ₂ .HNO ₃	257.834		100		
3313	CsNO ₂ .2HNO ₃	320.849		35		
3314	CsHC ₈ H ₄ O ₄ —Phthalate.....	297.849	R.		2.178	
3315	CsH(CCl ₃ CO ₂) ₂	458.566	M.		2.143	
3316	Cs ₂ SiF ₆	407.680			3.372 ¹⁷	
3317	CsGa(SO ₄) ₂ .12H ₂ O.....	610.845	C.		2.113	84
3318	Cs ₂ InCl ₃ .H ₂ O.....	575.725			3.350	
3319	Cs ₂ InBr ₃ .H ₂ O.....	798.015			3.776	
3320	CsIn(SO ₄) ₂ .12H ₂ O.....	655.925	C.		2.241	85
3321	Cs ₂ TlCl ₃ .H ₂ O.....	665.325			3.879	
3322	Cs ₂ Tl ₂ Cl ₃	1126.35	H.			361
3323	Cs ₂ Zn(SO ₄) ₂ .6H ₂ O.....	631.222	M.		2.875	552
3324	Cs ₂ Zn(SeO ₄) ₂ .6H ₂ O.....	725.492	M.		3.115	640
3325	Cs ₂ Cd(SO ₄) ₂ .6H ₂ O.....	678.252	M.		2.957	536
3326	CsCd(CNS) ₂	419.439		213		
3327	CsCl.HgCl ₂	439.794	C. R.			164
3328	Cs ₂ HgI ₄	973.958	M.		4.806	
3329	Cs ₂ Hg ₂ I ₄	1882.91	M.		5.14	
3330	Cs ₂ HgI ₆	1233.70	R.		4.605	
3331	Cs ₂ Cu(SO ₄) ₂ .6H ₂ O.....	629.412	M.		2.858	559
3332	2CsNO ₂ .AgNO ₂ .Bi(NO ₃) ₃	858.548			3.88 ¹⁸	
3333	CsSO ₄ .Ir ₂ (SO ₄) ₃ .24H ₂ O.....	1335.64	C.	110		
3334	CsRh(SO ₄) ₂ .12H ₂ O.....	644.035	C.	111		112
3335	CsMnO ₄	251.740			3.597 ^{10,3}	
3336	CsMn(SO ₄) ₂ .12H ₂ O.....	596.055	C.			200
3337	Cs ₂ Mn(SO ₄) ₂ .6H ₂ O.....	620.772	M.		2.740	524
3338	CsFeCl ₃ .2H ₂ O.....	331.055			2.907 ¹⁷	
3339	Cs ₂ FeCl ₄ .2H ₂ O.....	499.323			3.275	
3340	CsFe(SO ₄) ₂ .12H ₂ O.....	596.965	C.		2.061	100
3341	Cs ₂ Fe(SO ₄) ₂ .6H ₂ O.....	621.682	M.		2.796	550
3342	Cs ₂ FeSe ₂ O ₈ .6H ₂ O.....	715.952	M.		3.694	
3343	Cs ₂ SeO ₄ .Fe ₂ (SeO ₄) ₃ .24H ₂ O.....	1382.47	C.	60	3.618 ¹⁸	116
3344	Cs ₂ Co(SO ₄) ₂ .6H ₂ O.....	624.812	M.		2.844	566
3345	Cs ₂ Co(C ₂ H ₃ O ₄) ₂ .4H ₂ O—Malonate.....	600.682			2.682	
3346	Cs ₂ Ni(SO ₄) ₂ .6H ₂ O.....	624.532	M.		2.872	575
3347	CsCr(SO ₄) ₂ .12H ₂ O.....	593.135	C.	116	2.043	94
3348	CsV(SO ₄) ₂ .12H ₂ O.....	592.085			2.033 ⁴	
3349	3CsF.AlF ₃	539.390		823		
3350	Cs ₂ SO ₄ .Al ₂ (SO ₄) ₃ .24H ₂ O.....	1136.17	C.		1.867 ⁹	80
3351	2Cs ₂ O.2Al ₂ O ₃ .9SiO ₂ .H ₂ O—Pollucite.....	1325.64	C.		2.9	126
3352	Cs ₂ La(NO ₃) ₆ .2H ₂ O.....	750.601	M.		2.827 ⁹	
3353	Cs ₂ Mg(SO ₄) ₂ .6H ₂ O.....	590.162	M.		2.676	488
3354	Cs ₂ Mg(SeO ₄) ₂ .6H ₂ O.....	684.432	M.		2.94	583
3355	Cs ₂ Mg(CrO ₄) ₂ .6H ₂ O.....	630.052	M.		2.747	821
3356	Cs ₂ Cu ₂ Sr(SCN) ₇	1019.69	Tet.		2.882	374
3357	Cs ₂ Cu ₂ Ba(SCN) ₇	1069.45	Tet.		2.92	365
3358	Cs ₂ BaAg ₂ (SCN) ₇	1158.07	Tet.		3.026	360
3359	CsLiCl ₂	210.665		356.5		

Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Ra Rb Rh Ru S Se Sb Sc Sn Si Ss Sr Tb Tc Th Ti Tl Tm U V W Y Yb Zn Zr
76 42 47 11 32 51 61 45 1 35 12 23 41 60 37 80 84 40 39 8 63 14 56 9 18 22 78 52 66 10 24 19 27 70 49 50 48 57 71 28 21

BOILING POINTS

General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
1	100	89	414	204	— 95	294	d. <260
2	152.1	91	339	205	— 75	316	447
4	19.4	92	421	206	— 40	320	453
6	9.9 ⁷³¹	95	—151.0	207	73.5	322	500 d.
7	3.8 ⁷⁴⁴	96	21.3	208	162	337	—192.0
8	82	97	— 89.5	209	180	338	s. — 78.5
9	— 85.0	98	3.5	210	107.23	339	6.3
13	16 ¹⁸	99	47	211	212	341	2230
17	— 67.0	101	42.5	213	— 8	345	—112.0
21	40 ⁴⁰	102	— 33.35	214	172.9	346	— 15
23	135	103	113.5	215	106	347	53
26	— 35.5 ^{sat.}	104	118.5 ^{739.5}	216	193	348	80
31	s. 110	105	37	217	s. 38.8 ⁷⁴⁴	349	— 15.2
34	97	109	86	218	137.6	350	— 65 ¹⁰⁰¹
35	ca. 97	111	56.5	219	ca. 165	351	— 80.2
36	ca. 77 diss. s. 101 ^{1sat.}	114	diss. 40 ¹³	222	s. 61.8 ⁷⁰⁸	352	57.57
37	ca. 116	118	d. 210	223	490	353	139
38	— 10.0	120	s. ca. 140	224	514	356	213
39	44.6	125	— 56	226	407.5	357	150 ¹⁵
40	s. 10	126	— 63.5	227	523	358	190 ¹⁵
41	— 59.6	128	s. 105	228	515	360	137.0
42	74.5	129	<71	230	295	361	200
44	60 ⁴⁰	130	exp. 93	232	125	362	153
46	290	131	— 5.5	233	ca. 118	363	ca. 300
47	167	132	5	235	205 s. d.	364	— 30
53	— 30	139	s. 520	237	150 d.	365	8
54	— 52	140	d. <100	238	95 ⁴⁰	366	33
55	59	141	exp. 240	250	127 ¹³	367	153
57	138	142	— 2	251	328.5	368	ca. 240
58	78.8	143	ca. 32	252	224 ¹³	371	2
59	69.1	148	s. 542	253	262 ¹³	372	66
60	153 ¹⁶⁶	164	235 vac.	254	257 ¹³	373	109
62	151.5 ⁷⁴⁵	165	s. 551	255	291 ¹³	374	0 ⁴⁵
63	540 ¹⁸	166	220 vac.	256	s. 150 vac.	376	80
64	68 ⁴⁰	170	d. 15	263	—55	377	104
65	115 d.	172	s. 135	264	63 ⁷⁵²	378	140.5
66	s. 317	181	357.3	265	— 53	379	290
67	— 41.2	186	s. 120	266	122	381	220
68	— 42	191	490	268	221	382	113.5
72	100	192	d. 160	269	403	383	172
73	s. — 39	177	s. 140	271	565	384	235
74	d. 288	181	s. 80 d.	272	707	385	192
76	176.4	186	d. > — 13	274	ca. 300 d.	386	230.5
77	227	191	90 ³⁰⁰	282	— 17	387	255
81	183	192	s. ca. 180	284	149.5	388	s. 940 ²⁰
82	s. 450	193	s. 347 (α)	285	390	389	92 ^{18.3}
84	— 1.8	195	600 (β)	286	220.2	390	96
87	— 35.5	197	— 87.4	287	92 ²⁰	391	150 ^{18.3}
88	324	198	57.5 ⁷³⁵	291	280	403	s. 2210 diss.
			s. 280 d.	292	400.6	404	31

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
406	27	488	114.1	716	430	1515	78.6
407	63.5	490	620	749	732	1534	973
408	107	491	202	752	650	1552	136.7
409	96.2	492	50 ³⁰	753	624	1556	78 d.
410	90	493	65 ³⁰	755	s. 1185	1575	43 ⁷⁵¹
411	134 ^{752.9}	494	65 ³⁰	760	d. 280	1593	> 1300
412	122	495	720	769	500	1597	176
413	115.5	496	340	770	d. 271	1610	d. 175
414	108	497	191 d.	779	1100	1619	3800
415	142	499	1230	797	46	1624	340
416	139.5	508	180	798	118	1646	35
417	132	513	78	799	160	1647	s. 270
418	153.7	514	146	800	220	1648	180
419	171	515	181	825	970	1649	268
420	172.5	517	> 420	829	963	1658	170 d.
421	191	518	270 d.	832	713	1664	38 (in H ₂)
422	187	519	240	845	132	1672	19.5
423	205 ⁷⁵⁶	520	210	870	105	1673	187
425	114.3 ⁷⁵⁶	521	224	881	650	1674	275.6
426	122	522	170	882	383.7	1675	346.7
427	154	523	231	883	304	1676	266
428	153	528	1290	893	s. 345	1677	227.5
429	227	529	950	894	322	1678	333
432	195 ³⁰	530	exp. 105	896	310 d.	1679	327
435	100.5 ^{755.7}	543	916		s. 140	1689	6000
436	125	548	954	898	354	1690	6000
437	130	600	s. 475	901	s. 580	1706	69 ²⁴¹
438	149 ^{754.3}	619	110	915	d. 150		s. 56
439	141.5	621	130 ⁷⁵¹	918	96	1714	118
440	154.5	622	53 ¹⁴	919	159	1724	4100
441	201.5 ^{759.4}	623	152 ⁷⁵⁵	920	191	1747	111.2
442	107 ¹⁸	624	70.5 ¹⁶	921	135 ³⁰	1749	480
443	230	625	64.5 ¹⁴	922	> 306 d.	1752	148.5 ⁷⁵⁶
444	314.2	626	166 ⁷⁵⁹	939	1366	1753	127
449	284	627	78 ¹³	940	993	1755	127.19
450	136.4	628	83 ¹⁴	947	1345	1758	130
451	230	629	70 ¹³	951	1290	1767	3900
452	154	630	99.5 ¹⁰	958	d. 400	1796	219
454	> 360	631	105 ¹³	974	170 d.	1797	240.5
459	140	632	96 ¹³	1032	240 d.	1798	s. 400
460	138	633	108.2 ¹⁶	1059	1550	1799	4300
461	4300	634	123 ¹³	1075	444 d.	1802	229.5
465	- 90	635	124 ¹³	1129	s. 265	1803	242
466	29	636	121 ¹³	1147	134	1804	320
467	110.5	637	144.5 ¹³	1148	203	1805	5500
468	86.5	670	s. 610	1149	47.3	1810	87.5
469	72		725	1180	s. 240	1811	17
470	185.9	675	5000	1234	100.8 ¹³³	1812	d. 200
471	375	678	535	1268	1190	1813	- 101
472	163.5	679	217	1334	s. 1200 diss.	1814	12.5
480	416	693	139 diss.	1342	315	1815	90.6
481	5100	695	300	1397	102.8 ⁷⁴⁹	1817	210
485.5	- 52	696	806	1447	1049	1819	1230 ^{9.4}
486	705	700	815	1509	d. 52	1821	> 3500
487	623	703	824	1513	240	1822	110

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
1823	95	2010	d. 100	2500	1560	2921	1416
1824	65	2044	d. 100	2601*		2924	1380
1825	120	2105	590	2604	1670	2926	1330
1826	175	2112	188	2605	1353	2927	d. 225
1827	212	2113	245	2606	d. 270	2931	d. 215
1828	255	2114	270	2608	d. 410	2932	d. 180
1858	2210	2115	331	2610	1265	2936	d. 850
1864	182.7 ⁷⁵²	2116	330	2613	1190	2958	d. 350
	s. 177.8	2117	341	2625	d. > 170	2959	d. 400
1865	268	2118	239 ¹⁹	2668	1390	3196	1410
1866	d. 7	2131	1412	2670	1700	3197	1390
1869	382	2232	2850	2671	1413	3200	1340
1870	s. 1550 (in N ₂)	2234	450 diss.	2677	1390	3205	1300
1879	600 (in H ₂)	2236	> 1600	2680	1300	3283	1250
1893	130	2244	718	2769	1496	3284	1290
1894	194	2285	s. 898.6	2846	> 1400	3287	1300
1895	315	2495	795 diss.	2917	1320	3292	1280
1953	4600	2499	1400	2918	1500		

* Hüttig, 93, 141: 133; 24.

REFRACTIVE INDICES

A. LIQUIDS

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
1	436	1.833 ^{10.3}	18	45	1.429	34	625	1.5035 ^{22.5}	50	513	1.5201
2	97	1.193 ¹⁸	19	1893	1.432 ¹²	35	627	1.5062 ^{22.1}	51	628	1.5218 ¹⁸
3	9	1.256	20	62	1.437 ¹⁴	36	635	1.5081 ²²	52	58	1.527 ¹⁰
4	195	1.317 ^{17.5}	21	111	1.440 ^{22.5}	37	623	1.5082 ²¹	53	918	1.5327 ^{22.2}
5	17	1.325 ¹⁰	22	59	1.444	38	636	1.5097	54	919	1.5399 ^{22.2}
6	102	1.325 ^{14.5}	23	339	1.454	39	637	1.5118 ²¹	55	2644	1.548 ²⁵
7	95	1.330 ⁻⁹⁰	24	341	1.46	40	633	1.5120 ^{21.5}	56	55	1.557 ¹⁴
8	1	1.333	25	210	1.460 ^{24.1}	41	631	1.5127 ²⁵	57	1147	1.56 ⁴⁵
9	426	1.368	26	1808	1.464	42	619	1.5128	58	287	1.601 ¹⁴
10	41	1.374	27	26	1.466 ¹²	43	621	1.5132 ¹⁹	59	450	1.61 ^{10.5}
11	1825	1.381	28	103	1.470 ²²	44	515	1.5143	60	2472	1.618
12	109	1.397 ^{14.4}	29	1894	1.480 ^{4.5}	45	2847	1.515	61	57	1.666 ¹⁴
13	472	1.400	30	629	1.4926	46	624	1.5158 ^{24.3}	62	214	1.697 ^{24.6}
14	1827	1.408	31	634	1.5005	47	207	1.516 ¹⁴	63	1317	1.700
15	38	1.410	32	626	1.5021 ^{21.2}	48	622	1.5174	64	63	1.736
16	2	1.414 ²²	33	632	1.5023	49	630	1.5175 ^{19.7}	65	42	1.885
17	1828	1.421									

B. SOLIDS

I. Isotropic Group. m. = mean value

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
66	2670	1.336	95	3107	1.4814	127	2839	1.5305	160	260	1.7550
67	2913	1.339	96	3265	1.4815	128	3150	1.5329	161	1911	1.780
68	398	1.370	97	3084	1.4817	129	2671	1.5442	162	562	1.782
68.1	3143.6	1.403	98	3259	1.4823	130	1241	1.548	163	3292	1.7876
68.2	3017.6	1.408	99	2870	1.483	131	1451	1.55 (m.)	164	3327	1.792
69	344	1.41	100	3340	1.4839	132	1536	1.55 (m.)	165	1923	1.800
70	3032	1.4115	101	1613	1.4842	133	3200	1.5530	166	1928	1.801
70.1	2099.6	1.426	102	1369	1.4854	134	2924	1.5590	167	1921	1.811
70.2	478.5	1.433	103	2921	1.4903	135	2458	1.5667	168	2232	1.83
71	2235	1.4339	104	3197	1.493	136	1576	1.57	169	2282	1.83
72	2855	1.4388	105	2873	1.495	137	2531	1.5717	170	2364	1.838
73	2596	1.444	106	2902	1.496	138	2679	1.5943	171	1261	1.862?
74	2732	1.452	107	1910	1.4976	139	1187	1.6000	172	945	1.864 (m.)
75	1897	1.454	108	2872	1.50	140	2438	<1.6	173	939	1.93
76	2700	1.454	109	3253	1.5004	141	2394	1.608	174	278	2.0
77	3133	1.4562	109.5	2835	1.501	142	1383	1.61	175	402	2.05
78	3268	1.4566	110	743	1.5066	143	1576	1.61	176	1048	2.05
79	2760	1.457	111	3261	1.5070 ¹⁸	144	3284	1.6418	177	1059	2.0710
80	3350	1.4587	112	3334	1.5077	145	132	1.642	178	280	2.087
81	1882	1.4594	113	2887	1.508	146	3205	1.6474	179	581	2.09?
82	344	1.46	114	3137	1.509	147	3019	1.6574	180	1258	2.16
83	3242	1.4638	115	1240	1.5103	148	2267	1.660 (m.)	181	1639	2.16
84	3317	1.4649	116	3343	1.5116 ¹⁸	149	2401	1.67	182	668	2.20
85	3320	1.4652	117	2137	1.514	150	2926	1.6770	183	1123	2.20
86	3025	1.4653	118	2886	1.5144	151	3141	1.69	184	2333	2.20
87	3239	1.4658	119	2674	1.5151	152	3287	1.6984	185	1062	2.253
88	690	1.4664	120	2236	1.52	153	148	1.7031	186	951	2.346
89	680	1.4684	121	3047	1.522 (m.)	154	2225	1.705	187	756	2.3682
90	2740	1.4693	122	1633	1.5228	155	2392	1.710	188	936	2.705
91	2332	1.4736	123	2842	1.5230	156	2222	1.723			
92	2899	1.48	124	1422	1.5236	157	2415	1.735	188.1		2.89
93	3135	1.4801	125	3098	1.54 (m.)	158	2128	1.7364	188.2		3.56
94	3347	1.4810	126	3351	5.521	159	1145	1.74 (m.)	189	552	3.912

MISCELLANEOUS

Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n
190	367	1.579 ^{15,6} (F)	193	232	1.563 ¹¹ (C)	196	1274	2.69 (Li)	199	3236	1.46 (red)
191	266	1.621 ¹⁴ (F)	194	2196	2.35 (Li)	197	1273	2.70 (Li)	200	3336	1.48 (red)
192	352	1.412 (C)	195	890	2.49 (Li)	198	1053	> 2.72 (Li)	201	1528	2.18 (red)

II. Uniaxial Group

Serial No.	Gen. Index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
202	2778	1.300	1.296	247	2224	1.512	1.498
203	1	1.309	1.313	248	2866	1.518	1.522
204	2182	1.3439	1.3602	249	2422	1.522	1.513
205	2851	1.349	1.342	250	243	1.5246	1.4792
206	1323	1.3570	1.3742	251	2336	1.527	1.539
207	1409	1.3638	1.3848	252	764	1.5291	1.5039
208	2130	1.378	1.390	253	2453	1.5296	1.5252
209	814	1.3824	1.3992	254	3164	1.532	1.529
210	1583	1.3910	1.4066	255	1358	1.533	1.575
211	1047	1.4092	1.4080	256	1912	1.534	1.514
212	2237	1.417	1.393	257	2439	1.5364	1.4866
213	2347	1.436	1.478	258	3136	1.537	1.533
214	2713	1.4458	1.4524	259	3162	1.537	1.535
215	2941	1.455	1.515	260	1892	1.539	1.511
216	2735	1.4567	1.4662	261	2871	1.539	1.537
217	3216	1.4574	1.5078	262	1551	1.5393	1.5125
218	3173	1.4715	1.4721	263	2839	1.5398	1.5475
219	2107	1.4720	1.4395	264	2200	1.540	1.510
220	2119	1.473	1.435	265	2207	1.542	1.516
221	2412	1.475	1.486	266	2861	1.542	1.538
222	3185	1.481	1.461	267	342	1.544	1.553
223	1731	1.481	1.493	268	2659	1.545	
224	1970	1.482	1.473	269	2250	1.5496	
225	1995	1.482	1.474	270	1359	1.5519	1.5575
226	2018	1.486	1.479	270.5	2099.5	1.557	1.543
227	2031	1.487	1.479	271	2804	1.558	1.613
228	340	1.487	1.484	272	2129	1.559	1.580
229	2864	1.487	1.486	273	2226	1.56	
230	2493	1.487	1.496	274	1902	1.560	1.580
231	2397	1.49		274.5	475.5	1.563	1.552
232	2880	1.490	1.471	275	2199	1.565	
233	2086	1.490	1.480	276	2326	1.565	1.560
234	2054	1.490	1.481	277	2211	1.565	1.575
235	2072	1.490	1.482	278	2971	1.567	1.518
236	2869	1.490	1.502	279	2420	1.5690	1.6700
237	3181	1.4901	1.4996	280	1340	1.57	
238	1955	1.493	1.480	281	3134	1.572	1.592
239	2061	1.494	1.484	282	2357	1.575	1.57
240	2081	1.495	1.480	283	276	1.5766	1.5217
241	2403	1.496	1.491	284	2125	1.581	1.575
242	2436	1.4991	1.4758	285	1379	1.582	1.645
243	2329	1.507	1.468	286	1872	1.583	1.602
244	2968	1.5095	1.4684	287	2856	1.585	
245	2840	1.5095	1.5232	288	2705	1.5874	1.3361
246	1547	1.5109	1.4873	289	2188	1.5885	1.5970

Serial No.	Gen. index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
290	3186	1.589	1.590	346	1994	1.717	1.817
291	3079	1.59		347	2100	1.719	1.733
292	1582	1.59	1.56	348	1951	1.721	1.816
293	3033	1.5906	1.5907	349	1259	1.723	1.681
294	2399	1.595	1.585	350	969	1.724	1.746
295	2417	1.597	1.560	351	3187	1.7278	1.7361
296	847	1.6038	1.6042	352	1025.1	1.730	1.810
297	2904	1.612	1.593	353	2621	1.735	1.435
298	1978	1.613	1.607	354	978	1.744	1.724
299	2314	1.6150	1.6360	355	1414	1.755	1.82
300	2393	1.617	1.652	356	2563	1.757	1.804
301	1400	1.6198	1.5922	357	2594	1.760	1.577
302	2572	1.621	1.619	358	733	1.768	1.812
303	1737	1.623	1.625	359	1858	1.773	1.773
304	2309	1.625		360	3358	1.7761	1.6788
305	2489	1.629	1.639	361	3322	1.784	1.774
306	1011	1.632	1.575	362	3065	1.7909	1.6527
307	2430	1.633	1.639	363	2201	1.80	
308	2275	1.634	1.631	364	1699	1.80	1.72
309	2273	1.634	1.632	365	3357	1.8013	1.6882
310	2307	1.635	1.631	366	1089	1.8036	1.7983
311	556	1.635	1.653	367	2189	1.815	1.761
312	3042	1.636	1.615	368	1307	1.817	1.5973
313	1934	1.640		369	794	1.818	1.618
314	2490	1.64		370	3085	1.820	1.715
315	2507	1.640	1.633	371	1364	1.82	1.73
316	1252	1.6430		372	1063	1.8466	1.9200
317	1739	1.643	1.623	373	1433	1.85	
318	2234	1.644	1.446	374	3356	1.8535	1.6982
319	1044	1.644	1.697	375	1507	1.855	1.60
320	1046	1.644	1.702	376	2358	1.870	1.792
321	2216	1.65	1.59	377	1394	1.875	1.633
322	2644	1.65	1.67	378	1415	1.875	1.784
324	2441	1.651	1.627	379	1431	1.88	
325	1907	1.654	1.676	380	2339	1.913	1.923
326	2121	1.6542	1.6700	381	2366	1.918	1.934
327	1156	1.6576	1.6666	382	483	1.923	1.968
328	2285	1.6583	1.4864	383	1416	1.93	
329	1439	1.664	1.629	384	2339	1.945	1.971
330	2433	1.666	1.661	385	1324	1.96	
331	2274	1.667	1.666	386	1419	1.96	
332	2341	1.669	1.657	387	483	1.960	2.015
333	2410	1.669	1.658	388	2365	1.967	1.978
334	2537	1.669	1.665	389	569	1.970	1.936
335	2131	1.675	1.59	390	882	1.9733	2.6559
336	1084	1.6769	1.6294	391	485	1.997	2.093
337	2004	1.680	1.685	392	744	2.008	2.029
338	2597	1.681	1.668	393	310	2.01	1.82
339	2425	1.6817	1.5026	394	666	2.07	2.05
340	1914	1.694	1.641	395	657	2.09	1.94
341	812	1.694	1.723	396	658	2.114	2.140
342	2163	1.700	1.509	397	2957	2.12	2.00
343	2538	1.701	1.699	398	537	2.13	2.21
344	1324.1	1.704	1.679	399	587	2.135	2.118
345	2281	1.706	1.698	400	1064	2.21	2.22

Serial No.	Gen. index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
401	1695	2.2685	2.182	407	445	2.554	2.493
402	2187	2.31	1.95	408	2354	2.58	2.43
403	1776	2.354	2.299	409	447	2.616	2.903
404	755	2.356	2.378	410	403	2.654	2.697
405	1325	2.481	2.210	411	901	2.854	3.201
406	835	2.506	2.529	412	1095	3.0877	2.7924

MISCELLANEOUS

413	1522	1.3817 (C)	1.3872 (C)	420	1413	2.45 (Li)	2.51 (Li)
414	2035.1	2.005 (667)	2.004 (667)	421	1264	2.46 (Li)	2.15 (Li)
415	1957.1		2.013 (667)	422	1094	2.6 (Li)	
416	2002.1	2.019 (667)	2.007 (667)	423	524	2.665 (Li)	2.535 (Li)
417	526	2.3 (Li)		424	1334	3.01 (Li)	2.94 (Li)
418	538	2.35 (Li)	2.33 (Li)	425	1098	3.084 (Li)	2.881 (Li)
419	1668	2.402 (Li)	2.304 (Li)	426	2471	1.683 (red)	1.587 (red)

III. Biaxial Group

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
427	2852		1.364		462	1876	1.462	1.470	1.471
428	2694	1.394	1.396	1.398	463	343	1.469	1.47	1.473
429	2897		1.413		464	2150	1.4716	1.4730	1.4786
430	2898	1.407	1.414	1.415	465	2729	1.4653	1.4738	1.4804
431	2753	1.405	1.425	1.440	466	2691	1.464	1.474	1.485
432	2718	1.4193	1.4309	1.4493	467	3146	1.466	1.475	1.494
433	2724	1.4321	1.4361	1.4373	468	1874	1.474	1.476	1.483
434	2693		1.44		469	2617	1.460	1.477	1.488
435	3189	1.438	1.44	1.452	470	2398	1.461	1.478	1.485
436	2733	1.439	1.441	1.469	471	1356	1.4713	1.4782	1.4856
437	2723	1.4412	1.4424	1.4526	472	2948	1.475	1.480	1.487
438	2721		1.4434		473	2223	1.476	1.480	1.483
439	411	1.4368	1.4458	1.4510	474	3255	1.4767	1.4807	1.4907
440	2964	1.447	1.448	1.459	475	2708	1.391	1.481	1.486
441	2739	1.4453	1.4496	1.4513	476	2978		1.482	
442	3133	1.430	1.452	1.458	477	1918	1.478	1.482	1.482
443	2710	1.440	1.452	1.453	478	2862	1.480	1.482	1.493
444	2717	1.4499	1.4525	1.4604	479	3083	1.4759	1.4821	1.4969
445	2395	1.448	1.454	1.456	480	2715	1.4777	1.4822	1.5036
446	2890	1.435	1.455	1.459	481	1463	1.477	1.483	1.489
447	2145	1.4326	1.4554	1.4609	482	3029	1.4775	1.4833	1.4969
448	1809	1.340	1.456	1.459	483	2970	1.4768	1.4843	1.4870
449	2854	1.432	1.457	1.458	484	1289	1.4801	1.4840	1.4913
450	2720	1.4401	1.4629	1.4815	485	3247	1.4798	1.4848	1.4948
451	3149	1.4607	1.4629	1.4755	486	2977	1.440	1.485	1.550
452	2757		1.464		487	2719	1.4557	1.4852	1.4873
453	1871	1.459	1.464	1.470	488	3353	1.4857	1.4858	1.4916
454	2727	1.4599	1.4645	1.4649	489	138		1.486	
455	2616		1.465		490	760	1.4620	1.4860	1.4897
456	2738	1.4622	1.4658	1.4782	491	3043	1.4836	1.4864	1.5020
457	2743	1.4649	1.4663	1.4791	492	3091	1.4807	1.4865	1.5004
458	2943	1.4609	1.4669	1.5657	493	3148	1.483	1.487	1.490
459	2165	1.456	1.468	1.507	494	2853	1.484	1.487	1.496
460	2848	1.4468	1.4686	1.4715	495	3258	1.4815	1.4874	1.4977
461	3273	1.4672	1.4689	1.4779	496	3231		1.488	

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
497	2882	1.485	1.488	1.489	552	3323	1.5022	1.5048	1.5093
498	2881	1.486	1.488	1.489	553	3151	1.494	1.505	1.516
499	3245	1.4833	1.4884	1.4975	554	2469	1.497	1.505	1.509
500	854	1.4847	1.4887	1.4959	555	2900	1.505	1.505	1.506
501	1548	1.4669	1.4888	1.4921	556	2959	1.3346	1.5056	1.5064
502	3217	1.4812	1.4888	1.5719	557	2178		1.506	
503	2147	1.4856	1.4892	1.4911	558	2148	1.344	1.506	1.506
504	2725	1.4855	1.4897	1.5041	559	3331	1.5048	1.5061	1.5153
505	1924		1.49		560	1986		1.507	
506	2912		1.490		561	2299	1.493	1.507	1.545
507	1863	1.473	1.490	1.511	562	2132	1.495	1.507	1.528
508	2950	1.479	1.490	1.526	563	2765		1.5073	
509	2408	1.484	1.49	1.495	564	2696	1.4886	1.5079	1.5360
510	3249	1.4886	1.4906	1.5036	565	2868	1.504	1.508	1.545
511	2143		1.491		566	3344	1.5057	1.5085	1.5132
512	2171		1.491		567	2893	1.5043	1.5093	1.5751
513	1368	1.4870	1.4915	1.4989	568	2151	1.5070	1.5093	1.5169
514	3096	1.4836	1.4916	1.5051	569	3230		1.510	
515	3262	1.4859	1.4916	1.5014	570	2383	1.495	1.51	1.520
516	777	1.4888	1.4930	1.4994	571	2777	1.500	1.510	1.515
517	3184	1.492	1.493	1.496	572	2406	1.502	1.510	1.512
518	804		1.494		573	2663	1.504	1.510	1.516
519	2938	1.4935	1.4947	1.4973	574	2772		1.511	
520	2697	1.4820	1.4953	1.5185	575	3346	1.5087	1.5129	1.5162
521	1491	1.4902	1.4953	1.5032	576	3215	1.5131	1.5133	1.5144
522	2157	1.495	1.496	1.504	577	2289	1.510	1.514	1.578
523	3264	1.4895	1.4961	1.5052	578	2317	1.512	1.514	1.515
524	3337	1.4946	1.4966	1.5025	579	2922	1.440	1.515	1.525
525	1716		1.4967		580	2894	1.4435	1.5156	1.5233
526	2259	1.465	1.498	1.504	581	3159	1.500	1.5170	1.5183
527	2771	1.495	1.498	1.499	582	2551	1.500	1.517	1.525
528	2407	1.498	1.499	1.505	583	3354	1.5178	1.5179	1.5236
529	3152	1.4969	1.4991	1.5139	584	2553		1.518	
530	1361		1.500		585	2153	1.514	1.518	1.533
531	2901		1.5		586	2264	1.515	1.518	1.525
532	3014		1.500		587	1875	1.516	1.518	1.533
533	2638	1.40	1.50		588	3031	1.5121	1.5181	1.5335
534	2709	1.418	1.500	1.543	589	3092	1.5135	1.5195	1.5358
535	806	1.480	1.500	1.530	590	2228		1.52	
536	3325	1.498	1.500	1.506	591	3158		1.52	
537	2108	1.4664	1.5007	1.5027	592	2998	1.48	1.52	1.55
538	992	1.4910	1.5007	1.5054	593	2477	1.500	1.520	1.580
539	1557	1.4949	1.5007	1.5081	594	3221	1.51	1.52	1.524
540	2413		1.501		595	2154	1.510	1.520	1.543
541	2930		1.501		596	2860	1.516	1.52	1.520
542	2164	1.495	1.501	1.526	597	2466	1.484	1.521	1.538
543	179	1.4981	1.5016	1.5866	598	3246	1.5162	1.5222	1.5331
544	2498	1.4710	1.5017	ca. β	599	1466		1.5225	1.5227
545	2180	1.490	1.502	1.511	600	2249	1.5205	1.5226	1.5296
546	2737	1.4794	1.5021	1.5265	601	3176		1.523	
547	2371	1.499	1.503	1.538	602	174	1.5209	1.5230	1.5330
548	2396	1.501	1.503	1.510	603	3045	1.5096	1.5235	1.5387
549	3274	1.5011	1.5031	1.5135	604	2758	1.407	1.524	1.541
550	3341	1.5003	1.5035	1.5094	605	2405	1.513	1.524	1.525
551	2896	1.491	1.504	1.520	606	3139	1.518	1.524	1.526

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
607	3111	1.5221	1.5244	1.5373	662	2592	1.538	1.549	1.554
608	3097	1.5199	1.5248	1.5339	663	2014	1.5399	1.5494	1.5607
609	2294	1.470	1.525	1.555	664	1886		1.55	
610	2997		1.526		665	2204	1.5211	1.5500	1.5680
611	3157	1.508	1.526	1.550	666	2212	1.53	1.55	1.55
612	1370	1.5201	1.5260	1.5356	667	1032	1.545	1.55	
613	3138	1.522	1.526	1.530	668	2029	1.5413	1.5505	1.5621
614	2641		1.529		669	3074	1.5498	1.5513	1.5634
615	2865	1.525	1.529	1.536	670	2046	1.5427	1.5519	1.5629
616	2807	1.5193	1.5295	1.5436	671	3276		1.552	
617	2985	1.417	1.530	1.533	672	2736	1.5382	1.5535	1.5607
618	2304	1.515	1.530	1.580	673	3220	1.5515	1.5537	1.5582
619	1762	1.518	1.530	1.542	674	2288	1.491	1.555	1.650
620	778	1.5240	1.5300	1.5385	675	1360	1.533	1.555	1.635
621	2280	1.525	1.53	1.550	676	2292	1.545	1.555	1.575
622	2167	1.527	1.530	1.540	677	1927	1.551	1.555	1.562
623	1497	1.5246	1.5311	1.5396	678	3086		1.556	
624	2969	1.4893	1.5314	1.5363	679	2876	1.5520	1.5579	1.5608
625	2889	1.515	1.532	1.536	680	1884	1.551	1.558	1.582
626	2197	1.527	1.532	1.583	681	1925	1.554	1.558	1.573
627	2566		1.533		682	2637	1.530	1.560	1.590 ?
628	2759		1.533		683	2296	1.55	1.56	1.57
629	2190		1.533	1.5769	684	2618	1.5487	1.5602	1.5788
630	2166	1.489	1.534	1.557	685	3165	1.548	1.562	1.567
631	2432	1.517	1.534	1.565	686	188	1.5607	1.5630	1.5846
632	1861	1.5347	1.5347	1.5577	687	3305	1.5598	1.5644	1.5662
633	2286	1.460	1.535	1.545	688	838		1.565	
634	3015	1.495	1.535		689	2780	1.560	1.565	1.574
635	2382	1.500	1.535	1.560	690	1901	1.561	1.565	1.567
636	2302	1.515	1.535	1.575	691	3034		1.565	1.608
637	2142	1.523	1.535	1.586	692	1860	1.566	1.566	1.587
638	2295	1.525	1.535 ?	1.550	693	2642		1.567	
639	993	1.5213	1.5355	1.5395	694	2634	1.428	1.567	1.572
640	3324	1.5326	1.5362	1.5412	695	2298	1.450	1.567	1.600
641	961	1.5140	1.5368	1.5433	696	2774	1.536	1.567	1.649
642	1355	1.528	1.537	1.543	697	3002	1.527	1.568	1.647
643	1558	1.5291	1.5372	1.5466	698	2268	1.565	1.568	1.580
644	2404		1.539		699	3087	1.5660	1.5689	1.5831
645	3004		1.539		700	2877	1.565	1.569	1.569
646	2955	1.5352	1.5390	1.5446	701	2156	1.569	1.570	1.582
647	2179		1.54		702	2159	1.563	1.571	1.596
648	2293	1.460	1.540	1.610	703	2158	1.555	1.572	1.575
649	2218	1.520	1.54	1.545	704	2464	1.559	1.574	1.598
650	2217	1.527	1.540	1.544	705	2369	1.56	1.574	1.580
651	1512		1.542		706	2290	1.495	1.575	1.640
652	1030	1.413	1.542	1.557	707	2368	1.553	1.575	1.577
653	2859	1.466	1.542	1.596	708	2248	1.5693	1.5752	1.6130
654	1363	1.530	1.543	1.595	709	3063	1.5438	1.5754	
655	2981	1.415	1.545	1.565	710	643		1.576	
656	2265	1.539	1.545	1.551	711	1889	1.562	1.576	1.588
657	2878	1.545	1.546	1.551	712	1888	1.574	1.576	1.588
658	2036	1.5392	1.5479	1.5592	713	2504	1.5622	1.577	1.635
659	2558	1.542	1.548	ca. 1.548	714	3089		1.5772	
660	2198	1.544	1.548	1.572	715	2789	1.544	1.578	1.601
661	1950	1.5433	1.5490	1.5755	716	3057	1.569	1.579	1.669

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
717	2416	1.578	1.579	1.583	772	2321	1.605	1.61	1.612
718	2359	1.5700	1.5818	1.5961	773	2315	1.610	1.611	1.654
719	2370	1.560	1.582	1.587	774	2421	1.592	1.612	1.621
720	782	1.574	1.582	1.582	775	2559	1.597	1.612	1.621
721	2389		1.583		776	2335	1.609	1.6125	1.619
722	3073		1.5837		777	2173	1.520	1.613	1.639
723	2400	1.576	1.584	1.588	778	2356	1.602	1.613	1.649
724	1885	1.563	1.585	1.592	779	1913	1.588	1.617	1.655
725	2803	1.508	1.586	1.525	780	813	1.614	1.617	1.636
726	2227	1.585	1.586	1.596	781	2184	1.607	1.619	1.639
727	1903	1.552	1.588	1.600	782	1915	1.61	1.62	1.65
728	2181	1.539	1.589	1.589	783	1043	1.61	1.62	1.71
729	2591	1.584	1.589	1.594	784	1905	1.619	1.620	1.627
730	2279	1.5825	1.5891	1.5937	785	2419	1.620	1.620	1.654
731	3140	1.561	1.590	1.594	786	2429	1.609	1.623	1.635
732	2327	1.586	1.59	1.598	787	2583	1.610	1.623	1.623
733	2123	1.5595	1.5908	1.6311	788	2367	1.621	1.623	1.631
734	781	1.572	1.591	1.59	789	2451	1.6220	1.6237	1.6309
735	2385	1.572	1.591	1.594	790	2185	1.617	1.624	1.652
736	3056		1.592		791	809	1.531	1.625	1.659
737	1738	1.582	1.592	1.592	792	1035	1.541	1.625	1.660
738	2384	1.582	1.592	<1.606	793	783	1.614	1.625	1.637
739	2381	1.5863	1.5920	1.6139	794	1382	1.615	1.625	1.665
740	2658	1.579	1.593	1.597	795	2561	1.620	1.625	1.645
741	2798	1.5889	1.5943	1.7163	796	2411	1.616	1.626	1.649
742	1276	1.562	1.595	1.632	797	2431	1.621	1.627	1.635
743	2903	1.571	1.595	1.598	798	3178	1.6237	1.6278	2.2916
744	2523	1.5860	1.5951	1.6072	799	1514	1.532	1.628	1.665
745	2546	1.573	1.597	1.636	800	2316	1.616	1.629	1.631
746	2388	1.586	1.598	1.605	801	1920		1.63	
747	2775	1.573	1.599	1.657	802	1721	1.585	1.630	1.630
748	1987	1.5989	1.5999	1.6003	803	1321	1.602	1.632	1.632
749	2664		1.6		804	2230	1.603	1.632	1.639
750	2867		1.60		805	3275	1.622	1.633	1.644
751	2322	1.595	1.60	1.603	806	2386	1.632	1.634	1.636
752	3307	1.599	1.600	1.600	807	2308		1.635	
753	3179	1.5883	1.6007	1.6316	808	1580	1.541	1.636	1.669
754	2291	1.413	1.602	1.611	809	2767	1.577	1.636	1.639
755	786	1.586	1.602	1.608	810	3012	1.620	1.636	1.638
756	2278	1.590	1.602	1.638	811	1185		1.637	
757	1378	1.579	1.603	1.633	812	2470	1.453	1.637	1.707
758	1935	1.586	1.603	1.623	813	2206	1.636	1.637	1.653
759	2324	1.593	1.603	1.607	814	2640	1.507	1.638	1.698
760	2857	1.594	1.603	1.615	815	1898	1.632	1.638	1.643
761	2152	1.602	1.604	1.615	816	2521	1.6369	1.6381	1.6491
762	1357	1.51	1.605	1.611	817	3068	1.545	1.641	1.760
763	2440	1.567	1.605	1.626	818	2823	1.596	1.641	1.652
764	2122	1.591	1.605	1.614	819	1900	1.638	1.642	1.653
765	2269		1.606		820	2409	1.632	1.643	1.645
766	2895	1.595	1.606	1.634	821	3355	1.637	1.643	1.655
767	2555		1.607		822	2305	1.462	1.643	1.722
768	3003		1.607		823	2349	1.636	1.644	1.654
769	3052		1.6071		824	2320	1.642	1.645	1.654
770	3001	1.571	1.608	1.694	825	2501	1.635	1.646	1.660
771	880	1.617	1.609	1.593	826	1929	1.643	1.649	1.649

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
827	2564		1.651		882	2595	1.525	1.684	1.686
828	2177	1.635	1.651	1.670	883	941		1.685	
829	826		1.6513		884	2593	1.681	1.685	1.695
830	1916	1.612	1.652	1.675	885	1005	1.67	1.686	1.698
831	2387	1.625	1.653	1.669	886	1937	1.678	1.686	1.689
832	2176	1.650	1.653	1.658	887	2809		1.687	
833	2214	1.6527	1.6537	1.6748	888	1184	1.687	1.687	1.704
834	2863		1.654		889	1270.1	1.684	1.695	1.698
835	1298	1.647	1.654	1.660	890	1406	1.672	1.697	1.717
836	2175	1.651	1.654	1.660	891	1008	1.695	1.698	1.733
837	1919	1.633	1.655	1.662	892	2815	1.6610	1.6994	1.7510
838	2391	1.643	1.655	1.663	893	2810		1.70	
839	2126	1.652	1.655	1.671	894	2565		1.702	
840	2790	1.6491	1.6555	1.7143	895	2652		1.702	
841	2379	1.540	1.656	1.682	896	2418	1.700	1.702	1.706
842	1295	1.651	1.656	1.683	897	1294	1.695	1.704	1.710
843	1297	1.652	1.656	1.660	898	785	1.660	1.705	1.713
844	1069	1.6272	1.6573	1.6601	899	734		1.707	
845	1569	1.622	1.658	1.687	900	2229	1.705	1.709	1.711
846	1296	1.63	1.66	1.69	901	2428	1.708	1.711	1.718
847	2424	1.640	1.660	1.675	902	2350	1.709	1.711	1.724
848	1439	1.655	1.66	1.670	903	976	1.703	1.713	1.722
849	2910	1.645	1.661	1.688	904	2556	1.614	1.714	1.729
850	1505	1.6263	1.6614	1.6986	905	2480	1.7146	1.7174	1.812
851	1585	1.629	1.662	1.727	906	1720	1.691	1.720	1.720
852	2426	1.651	1.662	1.668	907	1899	1.712	1.720	1.728
853	2463	1.5155	1.664	1.666	908	2318	1.715	1.720	1.737
854	2660	1.660	1.666	1.676	909	2423	1.712	1.721	1.731
855	2372	1.642	1.667	1.669	910	2351	1.686	1.722	1.735
856	2215	1.662	1.667	1.673	911	1859	1.702	1.722	1.750
857	1388	1.635	1.668	1.702	912	1012	1.694	1.726	1.730
858	3064	1.626	1.6684	1.757	913	2510	1.7129	1.7266	1.7441
859	3005	1.485	1.669	1.697	914	1922	1.705	1.729	1.730
860	757	1.658	1.669	1.670	915	2417.1	1.724	1.729	1.734
861	2183		1.670		916	972	1.710	1.731	1.732
862	2340		1.670		917	1377	1.730	1.732	1.762
863	2186	1.668	1.670	1.690	918	793	1.708	1.733	1.758
864	2427	1.664	1.671	1.694	919	1670	1.720	1.733	1.935
865	1908	1.670	1.671	1.689	920	807	1.640	1.736	1.750
866	2858	1.634	1.673	1.685	921	964	1.730	1.737	1.785
867	2330	1.640	1.674	1.679	922	2360	1.732	1.737	1.751
868	2353	1.662	1.674	1.676	923	1841	1.617	1.738	1.776
869	2402	1.665	1.674	1.684	924	3101	1.7202	1.7380	1.8197
870	2905	1.666	1.674	1.688	925	1956	1.731	1.738	1.744
871	2800	1.671	1.674	1.684	926	2208		1.74	
872	2557	1.673	1.674	1.678	927	3100		1.74	
873	1381	1.653	1.675	1.697	928	1408	1.71	1.74	1.76
874	1389		1.676		929	1318	1.733	1.740	1.744
875	2542	1.529	1.676	1.677	930	1930	1.736	1.741	1.746
876	1926	1.643	1.678	1.684	931	1003		1.743	
877	3037	1.648	1.678	1.699	932	997	1.702	1.745	1.789
878	2651	1.676	1.679	1.687	933	2124	1.747	1.748	1.757
879	2741		1.6802		934	2484		1.749	
880	2284	1.5299	1.6809	1.6854	935	1726	1.72	1.75	1.80
881	792	1.662	1.683	1.717	936	1670	1.74	1.75	1.95

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
937	2781	1.743	1.754	1.764	985	2338	1.910	1.91	1.945
938	1028	1.730	1.758	1.838	986	261	1.871	1.92	2.01
939	967	1.708	1.760	1.798	987	1050	1.885	1.920	1.956
940	1000	1.719	1.762	1.805	988	3124	1.750	1.925	1.95
941	1387	1.765	1.774	1.797	989	1305	1.92	1.95	1.96
942	2573	1.770	1.774	1.783 ?	990	1365	1.702	1.955	1.965
943	2352	1.758	1.776	1.795	991	712	1.9493	1.9592	1.9640
944	966	1.730	1.778	1.803	992	663	1.947	1.961	1.968
945	1303	1.760	1.779	1.779	993	1722	1.955	1.985	2.05
946	1944	1.757	1.78	1.803	994	401		1.99	
947	2127	1.78	1.78	1.785	995	557	1.93	1.99	2.02
948	1045	1.752	1.782	1.815	996	660	1.87	2.00	2.01
949	1319	1.759	1.786	1.797	997	1723	1.90	2.00	2.05
950	1380	1.775	1.786	1.815	998	576		2.03	
951	1006	1.747	1.788	1.829	999	2219	1.908	2.05	2.065
952	1420	1.783	1.788	1.818	1000	573	2.042	2.050	2.050
953	1670	1.78	1.79	2.04	1001	617	1.8037	2.0763	2.0780
954	1300	1.780	1.793	1.802	1002	329		2.09	
955	2337		1.795		1003	2375	1.70	2.10	2.23
956	2808	1.763	1.799	1.813	1004	1326	2.08	2.1	2.16
957	735		1.80		1005	541	1.816	2.102	2.126 ?
958	1362	1.76	1.8	1.81	1006	539	2.0767	2.1161	2.1580
959	1301	1.783	1.801	1.834	1007	1696		2.15	
960	1007	1.79	1.807	1.84	1008	535	2.04	2.15	2.15
961	2376	1.775	1.815	1.825	1009	335	2.14	2.15	2.18
962	2582		1.816		1010	1421	2.12	2.17	2.31
963	583	1.74	1.82		1011	2374	1.77	2.18	2.35
964	1009	1.820	1.826	1.88	1012	473	2.13	2.19	2.20
965	2346	1.800	1.831	1.846	1013	1336	1.94	2.20	2.51
966	2802	1.750	1.832	1.832	1014	1327	2.10	2.20	2.31
967	1049	1.8090	1.8380	1.8593	1015	1391	2.19	2.20	2.33
968	999	1.69	1.84	1.85	1016	529	2.1992	2.2172	2.2596
969	1430	1.773	1.840	1.845	1017	1697	2.17	2.22	2.32
970	2363	1.825	1.842	1.857	1018	1671	2.09	2.24	2.26
971	2221	1.85	1.85	1.99	1019	1807	2.22	2.25	2.29
972	2220	1.85	1.85	2.02	1020	1784	2.17	2.26	2.32
973	639	1.789	1.852	1.877	1021	1781	2.18	2.27	2.35
974	2492		1.865		1022	536	2.24	2.27	2.31
975	707	1.8600	1.8671	1.8853	1023	1694	2.27	2.27	2.30
976	1010	1.73	1.870	1.91	1024	279	2.18	2.35	2.35
977	1027	1.655	1.875	1.909	1025	2331		2.38	
978	1407	1.835	1.877	1.886	1026	1335	2.26	2.39	2.40
979	1794	1.817	1.879	2.057	1027	878	2.37	2.5	2.65
980	1302	1.87	1.88	1.93	1028	446	2.583	2.586	2.741
981	553	1.8771	1.8823	1.8937	1029	917		3	
982	3010	1.527	1.903	1.952	1030	1096		3	
983	2334	1.900	1.907	2.034	1031	1101		3	
984	2361		1.91	1.91	1032	296	3.194	4.046	4.303

MISCELLANEOUS

1033	944	1.831	1.861 (green)	1.880	1037.1	3143.5	1.461		1.449
1034	429	1.3996		1.4102	1037.2	3017.5	1.466		1.455
1035	432	1.4057		1.4165	1038	3009	1.4676		1.620
1036	418	1.4248		1.4382	1039	1399	1.500		1.660
1037	2994	1.452		1.465	1040	2776	1.518		1.527

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
1041	2213	1.575		1.649	1061	1412	2.38	2.39 (Li)	2.42
1042	2644	1.584		1.604	1062	1698		2.40 (Li)	
1043	2646	1.594		1.614	1063	1800		2.40 (Li)	
1044	1322	1.62		1.63	1064	1766	2.41	2.50 (Li)	2.51
1045	2348	1.6226		1.7643	1065	1661		2.55 (Li)	
1046	2323	1.641		1.650	1066	1093	2.48	2.58 (Li)	2.60
1047	2570	1.6704			1067	271	2.46	2.59 (Li)	2.61
1048	2414	1.675		1.685	1068	525	2.51	2.61 (Li)	2.71
1049	2319	1.717		1.735	1069	1411		2.62 (Li)	
1050	1075	1.729		1.788	1070	887	2.35	2.64 (Li)	2.66
1051	2549			1.789	1071	272		> 2.72 (Li)	
1052	2560	1.810		1.830	1072	723	> 2.72	> 2.72 (Li)	
1053	716	1.817			1073	298	2.74 (Li)		> 2.72 (Li)
1054	582	1.90		1.97	1074	2770		1.473 (red)	
1055	3081	1.553	1.555 (Li)	1.571	1075	3177		1.5226 (red)	
1056	82	2.00	2.18 (Li)	2.35	1076	2524		1.532 (red)	
1057	2355	2.200	2.200 (Li)	2.290	1077	3114		1.591 (red)	
1058	1263	2.24	2.24 (Li)	2.53	1078	935		2.63 (red)	
1059	599	2.30	2.35 (Li)	2.40					
1060	1631	2.31	2.37 (Li)	2.66					

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Adelite, 2423	Atacamite, 944	Brandite, 2350	Chlorapatite, 2274	Cuprotungstite, 1696	Epsomite, 2145
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C-TABLE

[Compounds of carbon with elements having key-numbers below 16]

Acknowledgement is made to Prof. E. E. Reid for advice in connection with nomenclature and for his reading of the manuscript of this section.

Gen. index No.	Formula	Name of Table, p. 280	Molecular weight (i. e. T. atomic weights, s. p. 43)	Normal melting point, °C	Boiling point under 1 atm. (or mm. of Hg indicated by superscript)	Specific gravity 20°/4° (or at other indicated temperature)	Refractive index finding No. v. Table, p. 376
1	CBi ₂ O ₃	Bismutospherite.....	510.00	d.		7.35	
1.1	CBrClO	Carbonyl bromochloride.....	143.37		25	1.82 ¹⁴	
2	CBBrCl ₂	Bromotrichloromethane.....	198.29	-21	172	1.959 ^{14, 15}	697
3	CBBrN	Cyanogen bromide.....	105.92	52	61.6	2.015	
4	CBBr ₂ O	Carbonyl bromide.....	187.83		64.5	2.44	
5	CBBr ₂ NO ₂	Bromopicrin.....	297.76	10.3	127 ¹¹⁸	2.799	826
6	CBBr ₄	Carbon tetrabromide.....	331.66	α48.4 β90.1	189.5	3.42	
7	CCIN	Cyanogen chloride.....	61.466	-6	13.8	1.186	
8	CCl ₂ N ₂ O ₄	Dichlorodinitromethane Cl ₂ C(NO ₂) ₂	174.93	122.5			
9	CCl ₂ O	Carbonyl chloride (Phosgene).....	98.916	-104	8.3	1.392	
10	CCl ₂ S	Thiophosgene.....	114.98		73.5	1.509 ¹⁵	721
11	CCl ₂ NO ₂	Chloropicrin Cl ₂ CNO ₂	164.38	-64	112.4	1.692 ⁹	470
12	CCl ₄	Carbon tetrachloride.....	153.83	-23.0	76.8	1.595	476
13	CF ₄	Carbon tetrafluoride.....	88.00	-80	-15		
14	CIN	Cyanogen iodide.....	152.94	146.5			
15	CIN ₂ O ₄	Iodotrinitromethane CI(NO ₂) ₃	276.96	56			
16	CI ₄	Carbon tetraiodide.....	519.73	d.		4.32	
17	CN ₄ O ₄	Tetranitromethane C(NO ₂) ₄	196.03	13	125.7	1.650 ¹³	364
17.1	COS	Carbonyl sulfide.....	64.065	-138	-48	1.24 ⁻⁸⁷	
17.2	CSSe	Carbon sulfoselenide.....	123.265		84.5		
17.3	CS ₂	Carbon disulfide.....	76.130	-111.6	46.3	1.261 ²²	
17.4	CHBrCl ₂	Bromodichloromethane.....	163.84		92	1.925 ¹⁵	
18	CHBr ₃	Bromoform.....	252.76	7.7	150.4	2.890	772
19	CHCl ₃	Chloroform.....	119.38	-63.5	61.2	1.489	417
20	CHF ₃	Fluoroform.....	70.008		20 ⁴⁰ at.	2.53	
21	CHI ₃	Iodoform.....	393.80	119		4.1	1189
22	CHN	Hydrocyanic acid HCN.....	27.016	-14	26	0.699	809
23	CHNO	Cyanic acid HCNO.....	43.016	d.		1.140 ⁹	
24	CHNS	Thiocyanic acid CHNS.....	59.081	5	d.		
25	CHN ₂ O ₄	Nitroform CH(NO ₂) ₃	151.032	15	> 100 d.		
26	CH ₂ Br ₂	Methylene bromide.....	173.85	-52.8	97.8	2.46 ¹⁴	
27	CH ₂ ClNO	Carbamyl chloride ClCONH ₂	79.481	50	62		
28	CH ₂ Cl ₂	Methylene chloride.....	84.931	-96.7	40.1	1.336	273
29	CH ₂ I ₂	Methylene iodide.....	267.88	5.2; 5.7	180 d.	3.325	870
30	CH ₂ N ₂	Cyanamide CN.NH ₂	42.031	44	140 ¹⁹ d.	1.083	1073
31	CH ₂ N ₂	Diazomethane H ₂ C:N ₂	42.031	-145	-23		
32	CH ₂ N ₂ O ₄	Methylnitrolic acid O ₂ NCHNOH.....	90.031	64			
33	CH ₂ N ₂ O ₄	Dinitromethane H ₂ C(NO ₂) ₂	106.031	< -15	100 d.		
34	CH ₂ N ₄	Tetrazole.....	70.047	155			
35	CH ₂ O	Formaldehyde HCHO.....	30.015	-92	-21	0.815 ⁻²⁰	
36	(CH ₂ O) _x	Paraformaldehyde.....	(30.015) _x	160			
37	CH ₂ O ₂	Formic acid HCO ₂ H.....	46.015	8.4	100.5	1.220	25
38	CH ₃ AsCl ₂	Methylarsine dichloride.....	160.90	-59	136	1.838	
39	CH ₃ AsO	Methylarsinous oxide.....	105.98	95			
40	CH ₃ Br	Methyl bromide.....	94.939	-93	4.6	1.732 ⁹	696
41	CH ₃ Cl	Methyl chloride.....	50.481	-97.6	-23.7	0.920 ¹⁵	995
42	CH ₃ ClO	Methyl hypochlorite CH ₃ OCl.....	66.481		13.4		
43	CH ₃ ClO ₂ S	Methylsulfone chloride.....	114.546		160	1.510	
44	CH ₃ F	Methyl fluoride.....	34.023		-78.0		
45	CH ₃ I	Methyl iodide.....	141.96	-66.1	42.6	2.279	696
46	CH ₃ NO	Formamide HCONH ₂	45.031	-5	193	1.139	995
47	CH ₃ NO	Formaldoxime H ₂ C:NOH.....	45.031		84		
48	CH ₃ NO ₂	Nitromethane CH ₃ NO ₂	61.031	-29.2	101.9	1.139	43
49	CH ₃ NO ₂	Methyl nitrite CH ₃ ONO.....	61.031		-12	0.991 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
50	CH ₃ NO ₂	Methyl nitrate CH ₃ ONO ₂	77.031		exp. 65	1.217 ¹⁵	
51	CH ₃ NS	Thioformamide HCSNH ₂	61.096	29			
52	CH ₃ N ₃	Methyl azide.....	57.047		21	0.869 ¹⁶	
53	CH ₃ N ₂ O ₂	Nitrourea O ₂ NNHCONH ₂	105.05	150 d.			
54	CH ₄	Methane.....	16.0308	-184	-161.4	0.415 ⁻¹⁶⁴	
55	CH ₃ N ₂ O	Urea H ₂ NCONH ₂	60.047	132.7		1.335	1167
56	CH ₃ N ₂ O ₂	Methylnitramine CH ₃ NHNO ₂	76.047	38		1.243 ^{18, 6}	1077
57	CH ₃ N ₂ S	Ammonium thiocyanate.....	76.112	149.6	d. 160	1.305	
58	CH ₃ N ₂ S	Thiourea H ₂ NCSNH ₂	76.112	182		1.405	
59	CH ₃ N ₂ O ₂	Nitroguanidine H ₂ NC(:NH)N.HNO ₂ ...	104.063	231			
60	CH ₃ O	Methyl alcohol CH ₃ OH.....	32.031	-97.8	64.5	0.792	2
61	CH ₃ O ₂ S	Methylsulfonic acid CH ₃ SO ₃ H.....	96.096		167 ¹⁰	1.481	
62	CH ₃ O ₂ S	Methyl sulfuric acid CH ₃ SO ₄ H.....	112.09	< -30			
63	CH ₃ S	Methylmercaptan CH ₃ SH.....	48.096	-121.0	7.6	0.868	
64	CH ₃ As	Methylarsine CH ₃ AsH ₂	91.999		2		
64.1	CH ₃ AsO ₂	Methyl arsenate CH ₃ AsO(OH) ₂	139.999	161			1234
65	CH ₃ N	Methylamine CH ₃ NH ₂	31.047	-92.5	-6.5	0.699 ⁻¹¹	
66	CH ₃ NO	N-Methylhydroxylamine CH ₃ NHOH...	47.047	42	62.5 ¹⁶	1.0003	226
67	CH ₃ NO ₂	Ammonium formate HCO ₂ NH ₄	63.047	116		1.266	
67.1	CH ₃ NO ₂	Ammonium hydrogen carbonate.....	79.047	d.		1.573	1223
68	CH ₃ N ₂	Diazoaminomethane.....	59.063	-12	92 s. d.		
69	CH ₃ N ₂ O	Semicarbazide H ₂ NCONHNH ₂	75.063	96			
70	CH ₃ N ₂ O ₂	Urea nitrate H ₂ NCONH ₂ .HNO ₃	123.06	153 d.		1.664	
71	CH ₃ N ₂ S	Thiosemicarbazide H ₂ NCSNHNH ₂	91.128	183			
72	CH ₃ O ₂ P	Methylphosphinic acid CH ₃ PO(OH) ₂ ...	96.063	105			
73	CH ₃ P	Methylphosphine CH ₃ PH ₂	48.063		-14		
74	CH ₃ CIN	Methylamine hydrochloride.....	67.512	226	230 ¹⁶		
75	CH ₃ CIN ₂	Guanidine hydrochloride.....	95.528				1333
76	CH ₃ CIN ₂ O	Semicarbazide hydrochloride.....	111.53	173 d.			
77	CH ₃ N ₂	Methylhydrazine CH ₃ NHNH ₂	46.062		87.5		
78	CH ₃ N ₄	Methyltetrazine CH ₃ NHN:NNH ₂	74.078		130		
79	CH ₃ N ₂ O ₂	Guanidine nitrite (NH ₂) ₂ C(:NH).HNO ₂	106.08	78.5			
80	CH ₃ N ₂ O ₂	Guanidine nitrate.....	122.079				1333
81	CH ₃ N ₂ O ₄	Semicarbazide nitrate.....	138.08	123			
82	CH ₃ CINH ₄	Aminoguanidine hydrochloride.....	110.54	163			
83	C ₂ Br ₂	Dibromoacetylene BrC:CCBr.....	183.83		76	2	
84	C ₂ Br ₂ Cl ₂	1, 2-Dibromo-1, 2-dichloroethylene.....	254.75	4.4	172	2.304 ¹⁸	894
84.1	C ₂ Br ₂ Cl ₄	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane.	325.66			2.713	1308
85	C ₂ Br ₂ O ₂	Oxalyl bromide (COBr) ₂	215.83	-19.5	104.4		
86	C ₂ Br ₄	Tetrabromoethylene Br ₂ C:CCBr ₂	343.66	57.5	227		
87	C ₂ Br ₆	Hexabromoethane Br ₂ CCBr ₃	503.50		210	3.823	1316
88	C ₂ Cl ₂	Dichloroacetylene ClC:CCl.....	94.916	-50			
89	C ₂ Cl ₂ O ₂	Oxalyl chloride (COCl) ₂	126.916	-12	64	1.488 ^{19, 4}	822
90	C ₂ Cl ₄	Tetrachloroethylene Cl ₂ C:CCl ₂	165.83	-22.4	120.8	1.623	623
91	C ₂ Cl ₄ O ₂	Trichloromethyl chloroformate.....	197.83	-57	127.5	1.653 ¹⁴	
92	C ₂ Cl ₆	Hexachloroethane Cl ₃ CCCl ₃	236.75	185	185	2.091	
93	C ₂ I ₂	Diiodoacetylene IC:CI.....	277.86	82			
94	C ₂ I ₄	Tetraiodoethylene I ₂ C:CI ₂	531.73	187		2.983	
95	C ₂ N ₂	Cyanogen CN.CN.....	52.016	-34.4	-20.5	0.866 ^{17, 3}	
96	C ₂ N ₂ S	Cyanogen sulfide (CN) ₂ S.....	84.081	60			
97	C ₂ N ₂ O ₂	Trinitroacetone nitrile.....	176.03	41.5	exp. 220		
98	C ₂ N ₂ O ₄	Hexanitroethane (O ₂ N) ₂ CC(NO ₂) ₂ ...	300.05	142 d.			
99	C ₂ HBr	Bromoacetylene BrC:CH.....	104.924		-2		
100	C ₂ HBrCl ₂	1, 2-Dichloro-1-bromoethylene.....	175.84	-83.5	113.8	1.913 ¹⁸	867
101	C ₂ HBr ₃	Tribromoethylene Br ₂ C:CHBr.....	264.76		164	2.708	778
102	C ₂ HBr ₃ Cl ₂	1, 2, 2-Tribromo-1, 2-dichloroethane....	335.67	6	112 ¹⁶	2.635 ¹⁵	781
103	C ₂ HBr ₂ O	Bromal Br ₂ CCHO.....	280.76		174	2.30 ¹⁴	
104	C ₂ HBr ₂ O ₂	Tribromoacetic acid Br ₂ CCO ₂ H.....	296.76	130	245 d.		
105	C ₂ HBr ₅	Pentabromoethane Br ₃ CCHBr ₂	424.59	57	210 ³⁰⁰	3.312	
106	C ₂ HCl ₃	Trichloroethylene Cl ₂ C:CHCl.....	131.38	-86.4	88	1.477	525
107	C ₂ HCl ₃ O	Chloral Cl ₂ CCHO.....	147.38	-57.5	98.1	1.512	455
108	C ₂ HCl ₃ O	Dichloroacetyl chloride Cl ₂ CHCOCl....	147.38		108		
109	C ₂ HCl ₃ O ₂	Trichloroacetic acid Cl ₃ CCO ₂ H.....	163.38	57.5	195.3	1.617 ¹⁶	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
110	C ₂ HCl ₂ O ₂	Dichloromethyl chloroformate.....	163.38		116	1.558 ¹⁴	
111	C ₂ HCl ₃	Pentachloroethane Cl ₅ CCHCl ₃	202.298	-29.0	162	1.709 ⁹	614
112	C ₂ HF ₃	Trifluoroethylene.....	82.008		-51	1.26 ⁻⁷⁸	
112.1	C ₂ HF ₃ O ₂	Trifluoroacetic acid F ₃ CCO ₂ H.....	114.01	-15.6	72.5	1.535 ⁰	
113	C ₂ HI	Iodoacetylene IC:CH.....	151.94		32		
114	C ₂ HI ₂ O ₂	Triiodoacetic acid I ₃ CCO ₂ H.....	437.80	150 d.			
115	C ₂ H ₂	Acetylene HC:CH.....	26.015	-81.8	-83.6	Liq. 0.613 ⁻⁸⁰ Sol. 0.730 ⁻⁸¹	
116	C ₂ H ₂ AsCl ₃	2-Chlorovinylarsine dichloride.....	207.35		190	1.888	
117	C ₂ H ₂ BrCl	<i>cis</i> -1-Bromo-2-chloroethylene.....	141.39		84.7	1.797 ₄ ¹⁴	863
118	C ₂ H ₂ BrCl	<i>trans</i> -1-Bromo-2-chloroethylene.....	141.39	41	75.4	1.777 ₄ ¹⁴	864
119	C ₂ H ₂ BrClO	Chloroacetyl bromide ClCH ₂ COBr.....	157.39		135	1.913 ⁰	
120	C ₂ H ₂ BrClO ₂	Bromochloroacetic acid BrClCHCO ₂ H..	183.39	23.8	211.7 s. d.	1.985 ₁ ¹⁰	
121	C ₂ H ₂ BrCl ₂	1-Bromo-1, 2, 2-trichloroethane.....	212.31	-21	104.1	2.055 ₄ ⁰	
122	C ₂ H ₂ Br ₂	1, 1-Acetylene dibromide CH ₂ :CBr ₂	185.85		92	2.178	
123	C ₂ H ₂ Br ₂	1, 2-Acetylene dibromide BrCH:CHBr..	185.85		110.2	2.256	719
124	C ₂ H ₂ Br ₂ O	Bromoacetyl bromide BrCH ₂ COBr.....	201.85		150	2.317 _{21.1} ¹⁴	
125	C ₂ H ₂ Br ₂ O ₂	Dibromoacetic acid Br ₂ CHCO ₂ H.....	217.85	48	232		
126	C ₂ H ₂ Br ₂ Cl	1, 2, 2-Tribromo-1-chloroethane.....	301.22	20.6	220 d.	2.652 ₄ ¹⁴	780
127	C ₂ H ₂ Br ₄	1, 1, 1, 2-Tetrabromoethane BrCH ₂ CBBr ₃	345.68	0.0	103.5 ^{12.14}	2.875	794
128	C ₂ H ₂ Br ₄	1, 1, 2, 2-Tetrabromoethane.....	345.68	0.1	151 ¹⁴	2.964	796
129	C ₂ H ₂ ClIO ₂	Chloroiodoacetic acid ClICHCO ₂ H.....	220.41	90			
130	C ₂ H ₂ ClNO	Chloromethyl isocyanate ClCH ₂ CNO... 91.481	91.481		81		
132	C ₂ H ₂ Cl ₂	<i>cis</i> -1, 2-Acetylene dichloride.....	96.931	-50.0	48.4	1.265 ₁ ¹⁴	853
133	C ₂ H ₂ Cl ₂	<i>trans</i> -1, 2-Acetylene dichloride.....	96.931	-80.5	60.3	1.291 ₁ ¹⁴	854
134	C ₂ H ₂ Cl ₂ O	Dichloroacetaldehyde Cl ₂ CHCHO.....	112.931		90.5		
135	C ₂ H ₂ Cl ₂ O	Chloroacetyl chloride ClCH ₂ COCl.....	112.931		105	1.495 ⁰	
136	C ₂ H ₂ Cl ₂ O ₂	Dichloroacetic acid Cl ₂ CHCO ₂ H.....	128.931	10; -4	193.5	1.563	490
137	C ₂ H ₂ Cl ₂ O ₂	Chloromethyl chloroformate.....	128.931		108	1.516	
138	C ₂ H ₂ Cl ₂ NO	Trichloroacetamide Cl ₃ CCONH ₂	162.40	141	240		
139	C ₂ H ₂ Cl ₄	1, 1, 1, 2-Tetrachloroethane.....	167.85		130.5	1.588	528
140	C ₂ H ₂ Cl ₄	1, 1, 2, 2-Tetrachloroethane.....	167.85	-43.8	146.3	1.600	567
141	C ₂ H ₂ F ₂ O ₂	Difluoroacetic acid F ₂ CHCO ₂ H.....	96.015	-0.35	134.2 ⁷⁸⁸	1.526	4
142	C ₂ H ₂ F ₂ NO	Trifluoroacetamide F ₃ CCONH ₂	113.023	74.8	162.5		
143	C ₂ H ₂ I ₂ O ₂	Diiodoacetic acid I ₂ CHCO ₂ H.....	311.88	110			
144	C ₂ H ₂ N ₄	1, 2, 4, 5-Tetrazine.....	82.047	99			
145	C ₂ H ₂ O	Ketene CH ₂ :CO.....	42.015	-151	-56		
146	C ₂ H ₂ O ₂	Glyoxal CHO:CHO.....	58.015	15	50.4	1.14	46
147	C ₂ H ₂ O ₄	Oxalic acid HO ₂ CCO ₂ H.....	90.015	189		2	1194
148	C ₂ H ₂ Br	Vinyl bromide CH ₂ :CHBr.....	106.939	-137.8	15.8	1.517 ₄ ¹⁴	415
149	C ₂ H ₂ BrO	Acetyl bromide CH ₃ COBr.....	122.939	-96.5	76.7	1.52 ^{9.6}	
150	C ₂ H ₂ BrO ₂	Bromoacetic acid CH ₂ BrCO ₂ H.....	138.939	50	208	1.934	
151	C ₂ H ₂ Br ₃	1, 1, 2-Tribromoethane BrCH ₂ CHBr ₂ ..	266.77	-26	188.4	2.579	773
152	C ₂ H ₂ Br ₃ O	Tribromoethyl alcohol Br ₃ CCH ₂ OH....	282.77	80	94 ¹¹		
152.1	C ₂ H ₂ Br ₃ O ₂	Bromal hydrate.....	298.77	53			1333
153	C ₂ H ₂ Cl	Vinyl chloride CH ₂ :CHCl.....	62.481		-15		
154	C ₂ H ₂ ClO	Acetyl chloride CH ₃ COCl.....	78.481	-112.0	52	1.104	76
155	C ₂ H ₂ ClO ₂	Methyl chloroformate ClCO ₂ CH ₃	94.481		71.4	1.236 ¹⁴	
156	C ₂ H ₂ ClO ₂	Chloroacetic acid CH ₂ ClCO ₂ H.....	94.481	$\left\{ \begin{array}{l} \alpha 61.2 \\ \beta 56.3 \\ \gamma 50.1 \\ \delta 43.8 (?) \end{array} \right.$	189.5	1.370 ₄ ¹⁴	1099
157	C ₂ H ₂ Cl ₂ NO	Dichloroacetamide Cl ₂ CHCONH ₂	127.947	98	234.6		
158	C ₂ H ₂ Cl ₃	1, 1, 1-Trichloroethane CH ₃ CCl ₃	133.397		74.1	1.334	350
159	C ₂ H ₂ Cl ₃	1, 1, 2-Trichloroethane ClCH ₂ CHCl ₂ ..	133.397	-36.7	113.5	1.443	506
160	C ₂ H ₂ Cl ₃ O	Trichloroethyl alcohol Cl ₃ CCH ₂ OH....	149.397	17.8	152.2	1.550 ^{23.1}	
161	C ₂ H ₂ Cl ₃ O ₂	Chloral hydrate Cl ₃ CCH(OH) ₂	183.41	47.4	98 d.	1.908	1258
162	C ₂ H ₂ FO	Acetyl fluoride CH ₃ COF.....	62.023	> -60	20.5	0.993 ¹⁰	
163	C ₂ H ₂ FO ₂	Fluoroacetic acid CH ₂ FCO ₂ H.....	78.023	33	165		
164	C ₂ H ₂ I	Vinyl iodide CH ₂ :CHI.....	153.96		56	2.08 ⁰	
165	C ₂ H ₂ IO	Iodoacetaldehyde CH ₂ ICHO.....	169.96		80 d.		
166	C ₂ H ₂ IO	Acetyl iodide CH ₃ COI.....	169.96		108	1.98 ¹⁷	
167	C ₂ H ₂ IO ₂	Iodoacetic acid ICH ₂ CO ₂ H.....	185.96	82			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
168	C ₂ H ₃ N	Acetonitrile CH ₃ CN.....	41.031	-41	82	0.783	6
169	C ₂ H ₃ N	Methyl isocyanide CH ₃ NC.....	41.031	-45	59.6	0.756 ⁴	
170	C ₂ H ₃ NO	Glycollic nitrile HOCH ₂ CN.....	57.031		183	1.104	952
172	C ₂ H ₃ NO	Methyl isocyanate CH ₃ N:CO.....	57.031		43		
173	C ₂ H ₃ NO ₂	Nitroethylene CH ₂ :CHNO ₂	73.031		98.5	1.073 ^{12,3}	
174	C ₂ H ₃ NO ₂	Oxamic acid HO ₂ CCONH ₂	89.031	210 d.			
175	C ₂ H ₃ NO ₂	Nitroacetic acid O ₂ NCH ₂ CO ₂ H.....	105.03	89			
176	C ₂ H ₃ NS	Methyl thiocyanate CH ₃ CNS.....	73.096	-51	133	1.068	501
177	C ₂ H ₃ NS	Methyl isothiocyanate CH ₃ N:CS.....	73.096	35	119	1.069 ³⁷	1052
178	C ₂ H ₃ N ₃	1, 2, 4-Triazole.....	69.047	121	260		
179	C ₂ H ₃ N ₃ O ₆	1, 1, 1-Trinitroethane (O ₂ N) ₃ CCH ₃	165.05	56			
180	C ₂ H ₄	Ethylene H ₂ C:CH ₂	28.0308	-169.4	-103.8	0.566 ⁻¹⁰³	
181	C ₂ H ₄ BrCl	1-Bromo-2-chloroethane ClCH ₂ CH ₂ Br..	143.405	-16.6	103.7	1.79 ⁹	
182	C ₂ H ₄ BrNO	Acetobromoamide CH ₃ CONHBr.....	137.96	108			
183	C ₂ H ₄ Br ₂	1, 1-Dibromoethane CH ₃ CHBr ₂	187.86		110	2.056	647
184	C ₂ H ₄ Br ₂	Ethylene bromide BrCH ₂ CH ₂ Br.....	187.86	10.0	131.7	2.182	710
185	C ₂ H ₄ Br ₂ O	Dibromoethyl alcohol Br ₂ CHCH ₂ OH...	203.86		181	2.35 ⁹	
186	C ₂ H ₄ Br ₂ O	<i>sym.</i> -Dibromomethyl ether (BrCH ₂) ₂ O..	203.86	-34	155	2.201	
187	C ₂ H ₄ ClNO	Acetochloroamide CH ₃ CONHCl.....	93.497	110			
188	C ₂ H ₄ ClNO	Chloroacetamide ClCH ₂ CONH ₂	93.497	119.5	225.6		
189	C ₂ H ₄ Cl ₂	1, 1-Dichloroethane CH ₃ CHCl ₂	98.947	-96.7	57.3	1.174	227
190	C ₂ H ₄ Cl ₂	Ethylene chloride ClCH ₂ CH ₂ Cl.....	98.947	-35.3	83.7	1.257	400
191	C ₂ H ₄ Cl ₂ O	Dichloroethyl alcohol Cl ₂ CHCH ₂ OH...	114.947		146	1.145 ¹⁸	
192	C ₂ H ₄ Cl ₂ O	<i>sym.</i> -Dichloromethyl ether (ClCH ₂) ₂ O..	114.947		106	1.315	349
193	C ₂ H ₄ Cl ₂ OS	Di-(chloromethyl) sulfoxide.....	147.01	40			
194	C ₂ H ₄ Cl ₂ S	<i>sym.</i> -Dichloromethyl sulfide.....	131.012		58.5 ¹⁶	1.414 ¹⁴	
195	C ₂ H ₄ Cl ₂ NO	Chloral ammonia Cl ₂ CCHO.NH ₃	164.41	74	100 d.		
196	C ₂ H ₄ I ₂	1, 1-Diiodoethane CH ₃ CHI ₂	281.9		179	2.84 ⁹	
197	C ₂ H ₄ I ₂	Ethylene iodide ICH ₂ CH ₂ I.....	281.9	82	d.	2.132 ¹⁰	
199	C ₂ H ₄ N ₂ O ₂	Oxamide H ₂ NOCCNH ₂	88.047	419 d.		1.667	
200	C ₂ H ₄ N ₂ O ₂	Glyoxime NOH:CHCH:NOH.....	88.047	178			
201	C ₂ H ₄ N ₂ O ₂	Ethyl nitrolic acid CH ₃ C(NO ₂):NOH...	104.047	88	d.		
202	C ₂ H ₄ N ₂ O ₄	1, 1-Dinitroethane CH ₃ CH(NO ₂) ₂	120.047		186	1.350 ²²	
203	C ₂ H ₄ N ₂ O ₄	Ethylene dinitrite ONOCH ₂ CH ₂ ONO..	120.047	37.5	98	1.216 ⁹	
204	C ₂ H ₄ N ₂ O ₄	Ethylene nitrite nitrate.....	136.047	d.		1.472	
205	C ₂ H ₄ N ₂ O ₄	Dinitrolycol (CH ₂ ONO ₂) ₂	152.047	-20	exp. 116	1.496 ¹⁸	
207	C ₂ H ₄ N ₄	Dicyandiamide H ₂ NC(:NH)NHCN....	84.063	207			
208	C ₂ H ₄ O	Acetaldehyde CH ₃ CHO.....	44.031	-123.5	20.2	0.781	3
209	C ₂ H ₄ O	Ethylene oxide.....	44.031	-111.3	10.7	0.887 ⁷	803
210	C ₂ H ₄ OS	Thioacetic acid CH ₃ COSH.....	76.096	< -17	93	1.074 ¹⁰	
211	C ₂ H ₄ O ₂	Glycollic aldehyde HOCH ₂ CHO.....	60.031	97			
212	C ₂ H ₄ O ₂	Acetic acid CH ₃ CO ₂ H.....	60.031	16.6	118.1	1.049	26
213	C ₂ H ₄ O ₂	Methyl formate HCO ₂ CH ₃	60.031	-99.8	31.8	0.975	5
214	C ₂ H ₄ O ₂	Glycollic acid HOCH ₂ CO ₂ H.....	76.031	{ α63.0 β79			
215	C ₂ H ₄ O ₂	Methyl acid carbonate CH ₃ HCO ₃	76.031	-57			
216	C ₂ H ₄ O ₂	Ethylene ozonide.....	76.031		18 ¹⁶		
217	C ₂ H ₄ O ₂ S	Sulfoacetic acid HO ₂ SCH ₂ CO ₂ H.....	140.10	86			
218	C ₂ H ₄ S	Ethylene sulfide.....	60.096		55	1.034	
219	C ₂ H ₄ AsO ₂	Arsonoacetic acid (OH) ₂ AsOCH ₂ COOH	184.00	152			
220	C ₂ H ₅ Br	Ethyl bromide.....	108.955	-119.0	38.0	1.430	275
221	C ₂ H ₅ BrO	2-Bromoethyl alcohol BrCH ₂ CH ₂ OH...	124.955		150.3	1.685	555
222	C ₂ H ₅ BrO	Bromomethyl methyl ether.....	124.955		87	1.531 ^{12,3}	458
224	C ₂ H ₅ Cl	Ethyl chloride.....	64.497	-138.7	12.2	0.910	
225	C ₂ H ₅ ClO ₂ S	Chloromethyl methyl sulfate.....	160.56		92 ¹⁸	1.473	
226	C ₂ H ₅ Cl ₂ N	Ethyl dichloramine C ₂ H ₅ NCl ₂	113.963		89		
227	C ₂ H ₅ ClO	2-Chloroethyl alcohol ClCH ₂ CH ₂ OH...	80.497	-69.0	128.8	1.213	
228	C ₂ H ₅ ClO	Chloromethyl methyl ether.....	80.497		59.5	1.063 ¹⁰	107
229	C ₂ H ₅ ClO	Ethyl hypochlorite.....	80.497		36.6		
230	C ₂ H ₅ ClO ₂ S	Ethylsulfone chloride CH ₃ CH ₂ SO ₂ Cl...	128.562		177.5	1.357	
231	C ₂ H ₅ ClO ₄	Ethyl perchlorate.....	128.497		74		
232	C ₂ H ₅ F	Ethyl fluoride.....	48.039		-32	1.7	
233	C ₂ H ₅ FO	2-Fluoroethyl alcohol FCH ₂ CH ₂ OH....	64.039	-26.5	103.4	1.114	21

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
234	C ₂ H ₅ I	Ethyl iodide.....	155.97	-108.5	72.2	1.933	644
235	C ₂ H ₅ IO	2-Iodoethyl alcohol ICH ₂ CH ₂ OH.....	171.97		177 s. d.	2.905	
236	C ₂ H ₅ IO	Iodomethyl methyl ether ICH ₂ OCH ₃	171.97		125	2.025 ¹⁴	728
237	C ₂ H ₅ N	Vinylamine H ₂ C:CHNH ₂	43.047		56	0.832	
238	C ₂ H ₅ NO	Acetamide CH ₃ CONH ₂	59.047	{ 81.0 69.4	222	1.159	1107, 1173, 1198
239	C ₂ H ₅ NO	Acetaldoxime CH ₃ CH:NOH.....	59.047	47	115	0.966	1070
240	C ₂ H ₅ NO ₂	Acetohydroxamic acid CH ₃ CONHOH.....	75.047	88			
241	C ₂ H ₅ NO ₂	Aminoacetic acid H ₂ NCH ₂ CO ₂ H.....	75.047	233 d.		1.161	1274
242	C ₂ H ₅ NO ₂	Nitroethane CH ₃ CH ₂ NO ₂	75.047	< -50	114.8	1.056 ¹⁵	84
243	C ₂ H ₅ NO ₂	Ethyl nitrite CH ₃ CH ₂ ONO.....	75.047		17	0.900 ^{15, 16}	
244	C ₂ H ₅ NO ₂	Methyl carbamate CH ₃ CONH ₂	75.047	52	177		
245	C ₂ H ₅ NO ₂	Glycollicamide HOCH ₂ CONH ₂	75.047	120			
246	C ₂ H ₅ NO ₂	Nitroethyl alcohol O ₂ NCH ₂ CH ₂ OH.....	91.047	< -80	193.8	1.270 ¹⁵	
247	C ₂ H ₅ NO ₂	Ethyl nitrate CH ₃ CH ₂ ONO ₂	91.047	-102.0	88.7	1.105	54
248	C ₂ H ₅ NO ₄ (H ₂ O)	Ammonium hydrogen oxalate.....	107.047			1.556	
249	C ₂ H ₅ NO ₄	Nitroglycol HOCH ₂ CH ₂ NO ₂	107.047	d.		1.31 ¹¹	
250	C ₂ H ₅ NS	Thioacetamide CH ₃ CSNH ₂	75.112	108.5			
251	C ₂ H ₅ N ₂ O ₂	Biuret NH(CONH ₂) ₂	103.063	193			
252	C ₂ H ₆	Ethane CH ₃ CH ₃	30.0462	-172.0	-88.3	0.546 ⁻¹⁸	
253	C ₂ H ₅ AsBr	Cacodyl bromide (CH ₃) ₂ AsBr.....	184.92		130		
254	C ₂ H ₅ AsCl	Cacodyl chloride (CH ₃) ₂ AsCl.....	140.464		106.5	> 1	
255	C ₂ H ₅ AsCl ₂	Cacodyl trichloride (CH ₃) ₂ AsCl ₂	211.38	50 d.			
256	C ₂ H ₅ AsI	Cacodyl iodide (CH ₃) ₂ AsI.....	231.94		160		
257	C ₂ H ₅ NO	Aminoacetamide H ₂ NCH ₂ CONH ₂	74.06	65			
258	C ₂ H ₅ N ₂ O	Dimethylnitrosamine (CH ₃) ₂ N.NO.....	74.062		152.5	1.003	356
259	C ₂ H ₅ N ₂ O	N-Methylurea CH ₃ NHCONH ₂	74.062	101		1.204	
260	C ₂ H ₅ N ₄ O ₂	Oxalyl dihydrazide (CONHNH ₂) ₂	118.08	235 d.			
261	C ₂ H ₅ N ₃ S	Guanidine thiocyanate.....	118.143	118			
262	C ₂ H ₆ O	Ethyl alcohol C ₂ H ₅ OH.....	46.046	-117.3	78.5	0.789	17
263	C ₂ H ₆ O	Methyl ether CH ₃ OCH ₃	46.046	-138.0	-24.9	1.617	
264	C ₂ H ₆ O ₂	Glycol HOCH ₂ CH ₂ OH.....	62.046	-17.4	197.5	1.115	305
265	C ₂ H ₆ O ₂ S	Dimethyl sulfone (CH ₃) ₂ SO ₂	94.111	193	238		
266	C ₂ H ₆ O ₂ S	Methyl sulfite (CH ₃) ₂ SO ₃	110.111		126.5	1.046	
267	C ₂ H ₆ O ₄	Acetyl peroxide (CH ₃ CO) ₂ O ₂	94.046	30	63 ²¹		
268	C ₂ H ₆ O ₄ S	Ethylsulfuric acid C ₂ H ₅ SO ₃ H.....	126.111		d.	1.316 ¹⁷	
269	C ₂ H ₆ O ₄ S	Methyl sulfate (CH ₃) ₂ SO ₄	126.111	-31.8	188.8	1.333 ¹⁵	66
270	C ₂ H ₆ O ₄	Oxalic acid dihydrate.....	126.046	101.5		1.64	1206
271	C ₂ H ₆ O ₄ S ₂	Ethane-1, 2-disulfonic acid.....	190.18	104			
272	C ₂ H ₆ S	Methyl sulfide (CH ₃) ₂ S.....	62.111	-83.2	36.2	0.849	
273	C ₂ H ₆ S	Ethylmercaptan C ₂ H ₅ SH.....	62.111	-121.0	34.7	0.840	323
274	C ₂ H ₆ S ₂	Methyl disulfide CH ₃ SSCH ₃	94.176		118	1.046	
275	C ₂ H ₆ S ₂	Ethylenemercaptan HSCH ₂ CH ₂ SH.....	94.176		146	1.123	
276	C ₂ H ₆ Se	Ethylhydroselenide C ₂ H ₅ SeH.....	109.246		53.5	1.395	
277	C ₂ H ₆ Te	Methyl telluride (CH ₃) ₂ Te.....	157.546		82		
278	C ₂ H ₇ As	Dimethylarsine (CH ₃) ₂ AsH.....	106.014		36	1.213 ¹⁹	
279	C ₂ H ₇ As	Ethylarsine C ₂ H ₅ AsH ₂	106.014		36	1.217	
280	C ₂ H ₇ AsO ₂	Cacodylic acid (CH ₃) ₂ AsO.OH.....	138.014	200			
281	C ₂ H ₇ AsO ₂	Ethylarsonic acid C ₂ H ₅ AsO(OH) ₂	154.014	95			
282	C ₂ H ₇ N	Dimethylamine (CH ₃) ₂ NH.....	45.062	-96.0	7.4	0.680 ²	
283	C ₂ H ₇ N	Ethylamine C ₂ H ₅ NH ₂	45.062	-80.6	16.6	0.689 ¹¹	
284	C ₂ H ₇ NO	Acetaldehyde ammonia CH ₃ CHO.NH ₂	61.062	97	110 s. d.		1333
285	C ₂ H ₇ NO	2-Aminoethyl alcohol H ₂ NCH ₂ CH ₂ OH.....	61.062		171	1.022 ²⁰	446
286	C ₂ H ₇ NO	Dimethylhydroxylamine (CH ₃) ₂ NOH.....	61.062		42.4		
287	C ₂ H ₇ NO	α-Ethylhydroxylamine NH ₂ OC ₂ H ₅	61.062		68	0.883 ^{7, 16}	
288	C ₂ H ₇ NO	β-Ethylhydroxylamine C ₂ H ₅ NHOH.....	61.062	59 d.		0.908	1098
289	C ₂ H ₇ NO ₂	Ammonium acetate CH ₃ CO ₂ NH ₄	77.062	114		1.073	
290	C ₂ H ₇ NO ₂ S	Taurine H ₂ NCH ₂ CH ₂ SO ₃ H.....	125.127	88			
290.1	C ₂ H ₇ N ₂	Diazoaminoethane C ₂ H ₅ N.N.NH ₂	73.08	-12	92 s. d.		
291	C ₂ H ₇ N ₂ O ₄	Methylurea nitrate.....	137.08	128			
292	C ₂ H ₇ O ₂ P	Dimethylphosphinic acid (CH ₃) ₂ PO.OH.....	94.08	76			
293	C ₂ H ₇ O ₂ P	Ethylphosphinic acid C ₂ H ₅ PO(OH) ₂	110.08	44			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
294	C ₂ H ₇ P	Dimethylphosphine (CH ₃) ₂ PH.....	62.078		25		
295	C ₂ H ₇ P	Ethylphosphine C ₂ H ₅ PH ₂	62.078		25	<1	
296	C ₂ H ₅ BrN	Ethylamine hydrobromide.....	125.986	159.5		1.741	
297	C ₂ H ₅ ClN	Dimethylamine hydrochloride.....	81.528	171			
298	C ₂ H ₅ ClN	Ethylamine hydrochloride.....	81.528	109		1.216	
299	C ₂ H ₅ IN	Ethylamine hydroiodide C ₂ H ₅ NH ₂ ·HI..	173.00	188.5		2.100	
300	C ₂ H ₈ N ₂	Ethylenediamine H ₂ NCH ₂ CH ₂ NH ₂	60.078	8.5	117	0.892 ^{26,1}	1032
301	C ₂ H ₈ N ₂	<i>unsym.</i> -Dimethylhydrazine.....	60.078		64	0.794	987
302	C ₂ H ₈ N ₂	Ethylhydrazine C ₂ H ₅ NHNH ₂	60.078		101.5		
303	C ₂ H ₈ N ₂ O ₄ (H ₂ O)	Ammonium oxalate.....	124.078			1.501	1233
304	C ₂ H ₈ N ₄	Ethyltetrazine.....	88.094	< -20	140 d.		
305	C ₂ H ₈ N ₄ O ₂	Methylguanidine nitrate.....	136.09	150			
306	C ₂ H ₁₀ Cl ₂ N ₂	Ethylenediamine hydrochloride.....	133.01				1284
307	C ₂ H ₁₀ N ₂ O	Ethylenediamine hydrate.....	78.093	10	118	0.963	433
308	C ₂ H ₁₄ N ₄ O ₄ S	Aminoguanidine sulfate.....	246.24	161			
308.1	C ₂ Cl ₄ N ₂	Cyanuric trichloride.....	184.40	146		1.32	
309	C ₂ Cl ₆	Octachloropropane Cl ₃ CCCl ₂ CCl ₃	319.66	160	269		
310	C ₂ O ₂	Carbon suboxide OC:C:CO.....	68.00	-107	6.3	1.114 ⁹	802
311	C ₂ HCl ₃ O ₂	Trichloroacrylic acid Cl ₂ C:CClCO ₂ H...	175.38	72.9	223		
312	C ₂ HCl ₇	Heptachloropropane Cl ₃ CHCCl ₂ CCl ₃ ...	285.21	30	248	1.805 ²⁴	
313	C ₂ HN	Cyanoacetylene HC:CCN.....	51.016	5	42.5	0.816	911
313.1	C ₂ H ₂ Br ₂ N ₂ O	Dibromocyanoacetamide.....	245.86	123		2.375	
314	C ₂ H ₂ Cl ₂ O ₂	Malonyl chloride H ₂ C(COCl) ₂	140.93		58 ²⁴	1.450	1009
315	C ₂ H ₂ Cl ₂ NO	2, 2, 2-Trichlorolactic nitrile.....	174.40	61	220		
316	C ₂ H ₂ N ₂	Malonic nitrile H ₂ C(CN) ₂	66.031	32.1	220	1.049 ^{24,2}	1042
317	C ₂ H ₂ N ₂ O ₂	Parabanic acid CO<(NHCO) ₂ >.....	114.031	227 d.			1333
318	C ₂ H ₂ O	Propargyl aldehyde HC:CCHO.....	54.015		61		
319	C ₂ H ₂ O ₂	Propiolic acid HC:C.CO ₂ H.....	70.015	9	144 d.	1.139 ¹⁵	
320	C ₂ H ₂ BrO ₂	1-Bromoacrylic acid CH ₂ :CBrCO ₂ H...	150.94	70			
321	C ₂ H ₂ BrO ₂	2-Bromoacrylic acid BrCH:CHCO ₂ H...	150.94	116			
322	C ₂ H ₂ BrO ₄	Bromomalonic acid BrCH(CO ₂ H) ₂	182.94	112 d.			
323	C ₂ H ₂ Cl	3-Chloroallylene ClCH ₂ C:CH.....	74.481		65	1.045 ⁵	
323.1	C ₂ H ₂ ClO	Acryl chloride H ₂ C:CHCOCl.....	90.481		76	1.14 ⁹	
324	C ₂ H ₂ ClO ₂	1-Chloroacrylic acid CH ₂ :CClCO ₂ H...	106.48	65			
325	C ₂ H ₂ ClO ₂	2-Chloroacrylic acid ClCH:CHCO ₂ H...	106.48	85			
326	C ₂ H ₂ ClO ₄	Chloromalonic acid ClCH(CO ₂ H) ₂	138.48	133			
327	C ₂ H ₂ Cl ₃ O	1, 1, 1-Trichloroacetone CH ₃ COCCL ₃ ...	161.40		149		
328	C ₂ H ₂ Cl ₃ O	1, 1, 1'-Trichloroacetone.....	161.40		172		
329	C ₂ H ₂ Cl ₃ O ₂	Methyl trichloroacetate Cl ₃ CCO ₂ CH ₃ ...	177.40	-17.5	153.8	1.489 ^{19,2}	
330	C ₂ H ₂ Cl ₃ O ₂	2, 2, 2-Trichlorolactic acid.....	193.40	124	170 ⁴⁸		
331	C ₂ H ₂ Cl ₅	Pentachloropropane.....	216.31		198	1.607 ²⁴	645
332	C ₂ H ₂ N	Acrylic nitrile CH ₂ :CHCN.....	53.031	-82.0	79		
332.1	C ₂ H ₂ NO	Pyruvic nitrile CH ₃ COCN.....	69.04		93		
333	C ₂ H ₂ NO ₂	Cyanoacetic acid NCCH ₂ CO ₂ H.....	85.031	66	108 ^{9,15}		
334	C ₂ H ₂ NS	Thiazole.....	85.096		116.8	1.198	
335	C ₂ H ₂ N ₂ O ₂	Cyanuric acid.....	129.047	>360			1333
336	C ₂ H ₂ N ₂ O ₂	Fulminuric acid (CNOH) ₂	129.05	145 d.			
337	C ₂ H ₄	Allene H ₂ C:C:CH ₂	40.031	-146	-32		
338	C ₂ H ₄	Allylene HC:CCH ₂	40.031	-104.7	-27.5	0.660 ^{-12,9}	
339	C ₂ H ₄ Br ₂	<i>cis</i> -1, 2-Dibromopropylene.....	199.86		135.2	2.024	924
340	C ₂ H ₄ Br ₂	<i>trans</i> -1, 2-Dibromopropylene.....	199.86		126	2.024	925
341	C ₂ H ₄ Br ₂	2, 3-Dibromopropylene.....	199.86		142.3	1.934	
342	C ₂ H ₄ Br ₂ O ₂	1, 1-Dibromopropionic acid.....	231.86	61	221		
343	C ₂ H ₄ Br ₂ O ₂	1, 2-Dibromopropionic acid.....	231.86	64; 51	160 ²⁰		
344	C ₂ H ₄ Br ₄	1, 1, 2, 2-Tetrabromopropane.....	359.69		230 s. d.	2.94 ⁹	
345	C ₂ H ₄ Br ₄	1, 2, 2, 3-Tetrabromopropane.....	359.69	11	230 d.	2.653 ¹⁸	
346	C ₂ H ₄ Cl ₂ O	<i>sym.</i> -Dichloroacetone (ClCH ₂) ₂ CO....	126.947	45	173.4	1.383 ⁴⁸	
347	C ₂ H ₄ Cl ₂ O	<i>unsym.</i> -Dichloroacetone.....	126.947		120	1.234 ¹⁸	
348	C ₂ H ₄ Cl ₂ O ₂	2, 2-Dichloropropionic acid.....	142.947	56	190		
349	C ₂ H ₄ Cl ₂ NO ₂	Chloral formamide Cl ₂ CCHO.HCONH ₂ ...	192.41	116			
350	C ₂ H ₄ N ₂	Imidazole.....	68.047	90	256		
351	C ₂ H ₄ N ₂	Pyrazole.....	68.047	70	188		
352	C ₂ H ₄ N ₂ O	Cyanoacetamide NCCH ₂ CONH ₂	84.047	120			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
353	C ₃ H ₄ N ₂ O	Pyrazolone —NHCOCH ₂ CH:N—.....	84.047	165			
354	C ₃ H ₄ N ₂ O ₂	Hydantoin —NHCONHCH ₂ CO—.....	100.047	220			
355	C ₃ H ₄ O	Propargyl alcohol HC≡CCH ₂ OH.....	56.031	-17	115	0.972	324
356	C ₃ H ₄ O	Acrolein H ₂ C:CH.CHO.....	56.031	-87.7	52.5	0.841	119
357	C ₃ H ₄ O	Allylene oxide.....	56.031		63		
358	C ₃ H ₄ O ₂	Acrylic acid H ₂ CCHCO ₂ H.....	72.031	12.3	141.9	1.051	264
359	C ₃ H ₄ O ₂	Pyruvic acid CH ₃ COCO ₂ H.....	88.031	13.6	165	1.267	873
360	C ₃ H ₄ O ₄	Malonic acid CH ₂ (CO ₂ H) ₂	104.031	135.6			
361	C ₃ H ₄ O ₄	Methyl hydrogen oxalate.....	104.031	54	163.3	1.422 ²⁴	1191
362	C ₃ H ₄ O ₄	Tartronic acid HOCH(CO ₂ H) ₂	120.031	158 d.			1333
363	C ₃ H ₄ O ₄	Mesoxalic acid (HO) ₂ C(CO ₂ H) ₂	136.03	121			
364	C ₃ H ₃ Br	1-Bromopropylene CH ₂ CH:CHBr.....	120.955	-116.6	60.2	1.428 ^{19, 6}	452
365	C ₃ H ₃ Br	2-Bromopropylene CH ₃ CHBr:CH ₂	120.955	-124.8	48.4	1.362 ²⁰	
366	C ₃ H ₃ Br	3-Bromopropylene BrCH ₂ CH:CH ₂	120.955	-119.4	71.3	1.398	489
367	C ₃ H ₃ BrO	Bromoacetone CH ₃ COCH ₂ Br.....	136.955	-54	127	1.603	
368	C ₃ H ₃ BrO ₂	<i>d</i> L-1-Bromopropionic acid.....	152.955	25.7	203.5	1.700	522
369	C ₃ H ₃ BrO ₂	2-Bromopropionic acid.....	152.96	61			
370	C ₃ H ₃ Br ₂	1, 1, 2-Tribromopropane.....	280.79		201	2.356	
371	C ₃ H ₃ Br ₂	1, 2, 2-Tribromopropane.....	280.79		191	2.33 ¹²	
372	C ₃ H ₃ Br ₂	1, 2, 3-Tribromopropane.....	280.79	17	222	2.436 ²³	767
373	C ₃ H ₃ Cl	1-Chloropropylene CH ₂ CH:CHCl.....	76.497		36		
374	C ₃ H ₃ Cl	2-Chloropropylene CH ₃ CCl:CH ₂	76.497	-137.4	22.7	0.931 ⁹	
375	C ₃ H ₃ Cl	3-Chloropropylene ClCH ₂ CH:CH ₂	76.497	-136.4	44.6	0.938	222
376	C ₃ H ₃ ClN ₂ O ₄	Chlorodinitrohydrin.....	200.51	6.8	123 ¹⁵	1.54 ¹⁵	
377	C ₃ H ₃ ClO	Chloroacetone CH ₃ COCH ₂ Cl.....	92.497	-44.5	121	1.162 ¹⁶	
378	C ₃ H ₃ ClO	Propionyl chloride C ₂ H ₃ COCl.....	92.497	-94.0	80	1.065	152
379	C ₃ H ₃ ClO	α-Epichlorohydrin.....	92.497	-25.6	117	1.184	895
380	C ₃ H ₃ ClO ₂	Chloroacetyl carbinol.....	108.497	74 d.			
381	C ₃ H ₃ ClO ₂	1-Chloropropionic acid.....	108.497		186	1.306 ⁹	
382	C ₃ H ₃ ClO ₂	2-Chloropropionic acid.....	108.497	61	204		
383	C ₃ H ₃ ClO ₂	Ethyl chloroformate ClCO ₂ C ₂ H ₅	108.497	-80.6	95	1.139 ^{11, 2}	
384	C ₃ H ₃ ClO ₂	Methyl chloroacetate ClCH ₂ CO ₂ CH ₃	108.497	-32.7	131.5	1.22	
385	C ₃ H ₃ Cl ₂	1, 1, 2-Trichloropropane.....	147.413		137	1.372 ²⁴	
386	C ₃ H ₃ Cl ₂	1, 1, 3-Trichloropropane.....	147.413		148	1.362 ¹⁵	
387	C ₃ H ₃ Cl ₂	1, 2, 2-Trichloropropane.....	147.413		123	1.318 ²⁴	
388	C ₃ H ₃ Cl ₂	1, 2, 3-Trichloropropane.....	147.413	-14.7	156	1.417 ¹⁵	
389	C ₃ H ₃ Cl ₂ O	1, 1, 1-Trichloroisopropyl alcohol.....	163.413	50	161.3		
390	C ₃ H ₃ I	2-Iodopropylene CH ₂ Cl:CH ₂	167.97		103	1.835	
391	C ₃ H ₃ I	3-Iodopropylene ICH ₂ CH:CH ₂	167.97	-99.3	103.1	1.848 ¹²	
392	C ₃ H ₃ IO	Iodoacetone CH ₃ COCH ₂ I.....	183.97		58.4 ¹¹	2.17 ¹⁶	
393	C ₃ H ₃ IO ₂	1-Iodopropionic acid CH ₂ CHICO ₂ H.....	199.97	45.5	105 ^{9, 3}		
394	C ₃ H ₃ IO ₂	2-Iodopropionic acid ICH ₂ CH ₂ CO ₂ H.....	199.97	82			
395	C ₃ H ₃ N	Propionitrile C ₂ H ₅ CN.....	55.047	-91.9	97.1	0.783	22
396	C ₃ H ₃ N	Ethyl isocyanide C ₂ H ₅ NC.....	55.047	< -66	79	0.742 ^{21, 3}	19
397	C ₃ H ₃ NO	Ethyl isocyanate C ₂ H ₅ CNO.....	71.047		60	0.898	
398	C ₃ H ₃ NO	Acrylamide CH ₂ :CHCONH ₂	71.047	85			
399	C ₃ H ₃ NO	2-Hydroxypropionitrile HOCH ₂ CH ₂ CN.....	71.047		221	1.059	
400	C ₃ H ₃ NO	Lactonitrile CH ₂ CH(OH)CN.....	71.047	-40.0	184 s. d.	0.992	944
401	C ₃ H ₃ NO ₂	Isonitrosoacetone CH ₃ COCH(:NOH).....	87.407	69			
402	C ₃ H ₃ NO ₂	Allyl nitrite C ₃ H ₅ ONO.....	87.047		44	0.955 ⁹	
403	C ₃ H ₃ NS	Ethyl thiocyanate C ₂ H ₅ CNS.....	87.112	-85.5	144.4	0.996	494
404	C ₃ H ₃ NS	Ethyl isothiocyanate C ₂ H ₅ CSN.....	87.112	-5.9	132	0.995	651
405	C ₃ H ₃ NS ₂	μ-Mercaptothiazoline.....	119.177		217		
406	C ₃ H ₃ N ₃ O ₆	Glycerol trinitrite.....	179.06		154	1.291 ^{10, 5}	
407	C ₃ H ₃ N ₃ O ₆	Glycerol trinitrate.....	227.06	2.9	160 ¹⁵	1.601 ¹⁵	
				13.2	exp. 260		
408	C ₃ H ₆	Cyclopropane.....	42.046	-126.6	-34.4	0.720 ⁻⁷⁹	
409	C ₃ H ₆	Propylene CH ₃ CH:CH ₂	42.046	-185.2	-47.0	0.609 ⁻⁴⁷	
410	C ₃ H ₅ AsN	Cacodyl cyanide (CH ₃) ₂ AsCN.....	131.014		138		
411	C ₃ H ₅ Br ₂	1, 1-Dibromopropane CH ₃ CH ₂ CHBr ₂	201.88		130		
412	C ₃ H ₅ Br ₂	1, 2-Dibromopropane CH ₃ CHBrCH ₂ Br.....	201.88	-55.5	140	1.933	664
413	C ₃ H ₅ Br ₂	1, 3-Dibromopropane.....	201.88	-34.4	167.0	1.979	671
414	C ₃ H ₅ Br ₂	2, 2-Dibromopropane CH ₃ CHBr ₂ CH ₃	201.88		114.5	1.783	
415	C ₃ H ₅ Br ₂ O	1, 1'-Dibromoisopropyl alcohol.....	217.88		219	2.11 ¹⁶	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
416	C ₃ H ₇ BrO	2, 3-Dibromopropyl alcohol.....	217.88		219	2.168 ^o	
417	C ₃ H ₇ Cl ₂	1, 1-Dichloropropane CH ₃ CH ₂ CHCl ₂ ...	112.962		87	1.143 ¹⁰	
418	C ₃ H ₇ Cl ₂	1, 2-Dichloropropane CH ₃ CHClCH ₂ Cl...	112.962		96.8	1.166 ¹⁴	
419	C ₃ H ₇ Cl ₂	1, 3-Dichloropropane ClCH ₂ CH ₂ CH ₂ Cl...	112.962		125	1.201 ¹⁵	
420	C ₃ H ₇ Cl ₂	2, 2-Dichloropropane CH ₃ CCl ₂ CH ₃	112.962		69.7	1.093	177
421	C ₃ H ₇ Cl ₂ O	1, 1-Dichloroisopropyl alcohol.....	128.96		147.8	1.333	
422	C ₃ H ₇ Cl ₂ O	1, 1'-Dichloroisopropyl alcohol.....	128.96		174	1.367	532
423	C ₃ H ₇ Cl ₂ O	2, 3-Dichloropropyl alcohol.....	128.96		183	1.355	
424	C ₃ H ₇ Cl ₂ O ₂	Dichloromethylal H ₂ C(OCH ₂ Cl) ₂	144.96		166	1.352 ¹¹	
425	C ₃ H ₇ Cl ₃ N ₃	cis-Chloralimide.....	403.19	155			
426	C ₃ H ₇ INO	Iodoacetoxime ICH ₂ C(:NOH)CH ₃	198.99	64.5			
427	C ₃ H ₇ I ₂	1, 2-Diiodopropane CH ₃ CHICH ₂ I.....	295.91		d.	2.490	
428	C ₃ H ₇ I ₂	1, 3-Diiodopropane ICH ₂ CH ₂ CH ₂ I.....	295.91	-13.0	224	2.576 ¹⁵	797
429	C ₃ H ₇ I ₂	2, 2-Diiodopropane (CH ₃) ₂ CI ₂	295.91		148 d.	2.446 ^o	
431	C ₃ H ₇ N ₂	Pyrazoline.....	70.062		144		
432	C ₃ H ₇ N ₂ O	Ethyleneurea —CH ₂ NHCONHCH ₂ —...	86.062	131			
433	C ₃ H ₇ N ₂ O	Ethylideneurea CH ₃ CH:NCONH ₂	86.062	154	160 d		
434	C ₃ H ₇ N ₂ OS	Acetylthiourea CH ₃ CONHCSNH ₂	118.13	165			
435	C ₃ H ₇ N ₂ O ₂	Acetylurea NH(COCH ₃) ₂	102.062	217			
436	C ₃ H ₇ N ₂ O ₂	Malonamide H ₂ C(CONH ₂) ₂	102.062	170			
437	C ₃ H ₇ N ₂ O ₂	Methylglyoxime.....	102.06	153			
438	C ₃ H ₇ N ₂ O ₂	Hydantoic acid.....	118.062	171			
439	C ₃ H ₇ N ₂ O ₂	Propylnitrolic acid.....	118.06	66			
440	C ₃ H ₇ N ₂ O ₂	Methyl allophanate.....	118.06	208			
441	C ₃ H ₇ N ₂ O ₂	Propylpseudonitrole.....	118.06	76			
442	C ₃ H ₇ N ₂ O ₄	Nitrourethane C ₂ H ₅ CO ₂ NHNO ₂	134.06	64			
443	C ₃ H ₇ N ₂ O ₇	Glycerol-1, 3-dinitrate.....	182.06	< -30	148 ¹⁵	1.47 ¹⁵	
444	C ₃ H ₇ N ₂ O ₇	Ammonium fulminate.....	146.078	d.			1166
445	C ₃ H ₇ N ₃	Melamine (CNNH ₂) ₃	126.094	<250		1.573 ²⁰⁰	1311
446	C ₃ H ₇ O	Allyl alcohol CH ₂ :CHCH ₂ OH.....	58.046	-129	97.0	0.855	204
447	C ₃ H ₇ O	Propionaldehyde C ₂ H ₅ CHO.....	58.046	-81	48.8	0.807	20
448	C ₃ H ₇ O	Acetone CH ₃ COCH ₃	58.046	-94.3	56.1	0.7915	14
449	C ₃ H ₇ O ₂	Acetyl carbinol CH ₃ COCH ₂ OH.....	74.046	-17	146	1.082 ¹⁰	315
450	C ₃ H ₇ O ₂	Propionic acid C ₂ H ₅ CO ₂ H.....	74.046	-22	141.1	0.992	63
451	C ₃ H ₇ O ₂	Ethyl formate HCO ₂ C ₂ H ₅	74.046	-80.5	54.3	0.906	15
452	C ₃ H ₇ O ₂	Methyl acetate CH ₃ CO ₂ CH ₃	74.046	-98.1	57.1	0.933	18
453	C ₃ H ₇ O ₂	Glycide C ₂ H ₄ OCH ₂ OH.....	74.046		162 d.	1.165	
454	C ₃ H ₇ O ₂	Glyceric aldehyde HOCH ₂ CHOHCHO.....	90.046	138			
455	C ₃ H ₇ O ₂	Dihydroxyacetone HOCH ₂ COCH ₂ OH.....	90.046	75			
456	C ₃ H ₇ O ₂	d(l)-Lactic acid CH ₃ CH(OH)CO ₂ H.....	90.046	27			
457	C ₃ H ₇ O ₂	dl-Lactic acid CH ₃ CH(OH)CO ₂ H.....	90.046	18	122 ¹⁵	1.249 ¹⁵	381
458	C ₃ H ₇ O ₂	Dimethyl carbonate (CH ₃ O) ₂ CO.....	90.046	0.5	89.7	1.069 ²²	
459	C ₃ H ₇ O ₂	Ethyl acid carbonate C ₂ H ₅ HCO ₂	90.046	-57			
460	C ₃ H ₇ O ₂	Methyl glycollate HOCH ₂ CO ₂ CH ₃	90.046		151.2	1.168 ¹⁵	
461	C ₃ H ₇ O ₂	α-Trihydroxymethylene.....	90.046	64	s. 46		
462	C ₃ H ₇ S	Allyl mercaptan CH ₂ :CHCH ₂ SH.....	74.111		90		
463	C ₃ H ₇ AsO ₂	Allylarsonic acid.....	166.01	128			
464	C ₃ H ₇ Br	n-Propyl bromide CH ₃ CH ₂ CH ₂ Br.....	122.97	-110.0	70.9	1.353	346
465	C ₃ H ₇ Br	Isopropyl bromide (CH ₃) ₂ CHBr.....	122.97	-89.0	59.6	1.310	289
466	C ₃ H ₇ BrO	Bromoisopropyl alcohol.....	138.97		148		
467	C ₃ H ₇ BrO	3-Bromopropyl alcohol.....	138.97		112 ¹⁵⁵	1.537	
468	C ₃ H ₇ Cl	n-Propyl chloride CH ₃ CH ₂ CH ₂ Cl.....	78.512	-122.8	46.6	0.890	71
469	C ₃ H ₇ Cl	Isopropyl chloride (CH ₃) ₂ CHCl.....	78.512	-117.0	36.5	0.860	
470	C ₃ H ₇ ClO	Chloroisopropyl alcohol.....	94.512		126	1.115 ²⁰	371
471	C ₃ H ₇ ClO	2-Chloropropyl alcohol.....	94.512		134	1.103	354
472	C ₃ H ₇ ClO ₂	2-Chloro-1, 3-dihydroxypropane.....	110.512		124.5 ^{14.5}	1.321	
473	C ₃ H ₇ ClO ₂	3-Chloro-1, 2-dihydroxypropane.....	110.512		213 d.	1.322	
474	C ₃ H ₇ F	n-Propyl fluoride CH ₃ CH ₂ CH ₂ F.....	62.054		2		
475	C ₃ H ₇ I	n-Propyl iodide CH ₃ CH ₂ CH ₂ I.....	169.99	-101.4	102.4	1.747	621
476	C ₃ H ₇ I	Isopropyl iodide (CH ₃) ₂ CHI.....	169.99	-90.8	89.5	1.703	597
477	C ₃ H ₇ IO	Iodoisopropyl alcohol.....	185.99		105 ⁶⁰		
478	C ₃ H ₇ IO	3-Iodopropyl alcohol.....	185.99		225.4	2.349 ¹³	
479	C ₃ H ₇ N	Allylamine CH ₂ :CHCH ₂ NH ₂	57.062		53.2	0.761	237

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
480	C ₂ H ₇ NO	Aminoacetone CH ₃ COCH ₂ NH ₂	73.062		189 d.		
481	C ₂ H ₇ NO	Acetoxime CH ₃ CH:NOH.....	73.062	61	136.3	0.97 ₂₀ ¹⁰	1162
482	C ₂ H ₇ NO	Propionamide C ₂ H ₅ CONH ₂	73.062	79	213	1.042	1153
483	C ₂ H ₇ NOS	Thiourethane C ₂ H ₅ COSNH ₂	105.13	108			
484	C ₂ H ₇ NO ₂	<i>d</i> -Alanine CH ₃ CH(NH ₂)CO ₂ H.....	89.062				1225
485	C ₂ H ₇ NO ₂	<i>d</i> -Alanine.....	89.062	295	s. >200		
486	C ₂ H ₇ NO ₂	Sarcosine CH ₃ NHCH ₂ CO ₂ H.....	89.062	210 d.			
487	C ₂ H ₇ NO ₂	1-Nitropropane C ₂ H ₅ CH ₂ NO ₂	89.062		131.5	1.011 ¹⁶	136
488	C ₂ H ₇ NO ₂	2-Nitropropane CH ₃ CH(NO ₂)CH ₃	89.062		120	1.024 ⁹	
489	C ₂ H ₇ NO ₂	Propyl nitrite C ₂ H ₅ ONO.....	89.062		57	0.935	16
490	C ₂ H ₇ NO ₂	Isopropyl nitrite (CH ₃) ₂ CHONO.....	89.062		45	0.844 ²⁸	
491	C ₂ H ₇ NO ₂	Lactamide CH ₃ CH(OH)CONH ₂	89.062	74		1.138 ⁴⁰	
492	C ₂ H ₇ NO ₂	Urethane C ₂ H ₅ OCONH ₂	89.062	48	180	1.11 ₂₀ ²⁰	
493	C ₂ H ₇ NO ₂	<i>d</i> -Serine HOCH ₂ CH(NH ₂)CO ₂ H.....	105.062	246 d.			
493.1	C ₂ H ₇ NO ₂	<i>d</i> -Serine HOCH ₂ CH(NH ₂)CO ₂ H.....	105.062	228 d.			1249
494	C ₂ H ₇ NO ₂	Isoserine H ₂ NCH ₂ CH(OH)CO ₂ H.....	105.062	242 d.			
495	C ₂ H ₇ NO ₂	Propyl nitrate C ₂ H ₅ ONO ₂	105.062		100.5	1.053 ²⁸	105
496	C ₂ H ₇ NO ₂	Isopropyl nitrate (CH ₃) ₂ CHONO ₂	105.062		102	1.036	
497	C ₂ H ₇ NO ₂	Glycerol-1-nitrate.....	137.06	58	160	1.40	
498	C ₂ H ₇ NO ₂	Glycerol-2-nitrate.....	137.06	54	160	1.40	
499	C ₂ H ₇ N ₂ O	Acetaldehyde semicarbazone.....	101.08	162			
500	C ₃ H ₈	Propane CH ₃ CH ₂ CH ₃	44.062	-189.9	-44.5	0.585 ^{-44.5}	
501	C ₃ H ₇ ClNO ₂ S	Cysteine hydrochloride.....	157.59	175			
502	C ₃ H ₈ N ₂ O	1, 2-Dimethylurea CO(NHCH ₃) ₂	88.078	102.5	270	1.142	
503	C ₃ H ₈ N ₂ O	1, 1-Dimethylurea (CH ₃) ₂ NCONH ₂	88.078	182		1.255	
504	C ₃ H ₈ N ₂ O	Ethylurea C ₂ H ₅ NHCONH ₂	88.078	92		1.213 ¹⁸	
505	C ₃ H ₈ O	<i>n</i> -Propyl alcohol C ₂ H ₅ CH ₂ OH.....	60.062	-127	97.8	0.804	59
506	C ₃ H ₈ O	Isopropyl alcohol (CH ₃) ₂ CHOH.....	60.062	-85.8	82.3	0.786	37
508	C ₃ H ₈ O	Methyl ethyl ether CH ₃ OC ₂ H ₅	60.062		7.9	0.697	
509	C ₃ H ₈ OS ₂	1, 2-Dithioglycerol.....	124.192	130 d.		1.342 ^{14.4}	
510	C ₃ H ₈ O ₂	1, 2-Propyleneglycol.....	76.062		189	1.038 ²²	
511	C ₃ H ₈ O ₂	Trimethyleneglycol HO(CH ₂) ₃ OH.....	76.062		214 d.	1.053	
512	C ₃ H ₈ O ₂	Glycol methyl ether HOCH ₂ CH ₂ OCH ₃	76.062		124.6	0.969 ¹⁵	
513	C ₃ H ₈ O ₂	Methylal HCH(OCH ₃) ₂	76.062	-104.8	44	0.862	8
514	C ₃ H ₈ O ₂ S	1-Thioglycerol HOCH ₂ CH ₂ (OH)CH ₂ SH.....	108.127		d.	1.295 ^{14.4}	
515	C ₃ H ₈ O ₂	Glycerol HOCH(CH ₂ OH) ₂	92.062	17.9	290	1.260	512
516	C ₃ H ₈ S ₂	Trithioglycerol HSCH(CH ₂ SH) ₂	140.257	d.		1.391 ^{14.4}	
517	C ₃ H ₈ S	Methyl ethyl sulfide CH ₃ SC ₂ H ₅	76.127	-104.8	66	0.837	
518	C ₃ H ₈ S	<i>n</i> -Propyl mercaptan C ₂ H ₅ SH.....	76.127	-111.5	68		
519	C ₃ H ₈ S	Isopropyl mercaptan (CH ₃) ₂ CHSH.....	76.127		60		
520	C ₃ H ₈ As	Trimethylarsine (CH ₃) ₃ As.....	120.029		52.8	1.124 ²²	
521	C ₃ H ₈ AsO ₂	Propylarsonic acid C ₂ H ₅ AsO ₂ H.....	168.03	126			
522	C ₃ H ₈ Bi	Trimethyl bismuthine (CH ₃) ₃ Bi.....	254.07		110	2.300 ¹⁸	
523	C ₃ H ₈ ClN ₂ O	Lactamidine hydrochloride.....	124.54	171			
524	C ₃ H ₈ N	<i>n</i> -Propylamine C ₂ H ₅ NH ₂	59.077	-83.0	48.7	0.719	72
525	C ₃ H ₈ N	Isopropylamine (CH ₃) ₂ CHNH ₂	59.077	-101.2	34	0.694	875
526	C ₃ H ₈ N	Trimethylamine (CH ₃) ₃ N.....	59.077	-124.0	3.5	0.662 ^{-1.2}	
527	C ₃ H ₈ N ₂ O ₂	Guanidine acetate.....	119.09	230			
528	C ₃ H ₈ O ₄ P	Trimethyl phosphate (CH ₃) ₃ PO ₄	140.09		193	1.220 ¹⁵	
529	C ₃ H ₈ P	Propylphosphine C ₂ H ₅ PH ₂	76.093		53.5		
530	C ₃ H ₈ P	Trimethylphosphine (CH ₃) ₃ P.....	76.093		42	>1	
531	C ₃ H ₈ Sb	Trimethylstibine (CH ₃) ₃ Sb.....	166.84		80.6	1.523 ¹⁵	
532	C ₃ H ₁₀ ClN	Trimethylamine hydrochloride.....	95.543	275 d.			
533	C ₃ H ₁₀ N ₂	<i>d</i> -Propylenediamine CH ₂ (CH ₂ NH ₂) ₂	74.093		119	0.878	
534	C ₃ H ₁₀ N ₂	Trimethylenediamine H ₂ N(CH ₂) ₃ NH ₂	74.093		135.5		
535	C ₃ H ₁₁ N ₂ O ₂	Guanidine carbonate.....	180.14	197		1.251 ⁴	1169
537	C ₄ Br ₄ S	Thiophene tetrabromide.....	399.73	112			
538	C ₄ Cl ₁₀ O	Perchloroether (C ₂ Cl ₅) ₂ O.....	418.58	69		1.900 ¹⁴	
539	C ₄ F ₆ O ₂	Trifluoroacetic anhydride (F ₃ CCO) ₂ O.....	210.00	-65	40.5		
540	C ₄ I ₂	Diiododiacetylene IC:CC:CI.....	301.86	101			
541	C ₄ HBr ₄ N	Tetrabromopyrrole.....	382.68	250			
542	C ₄ HI ₄ N	Tetraiodopyrrole.....	570.74	150 d.			
543	C ₄ HN ₃	Cyanoform CH(CN) ₃	91.032	93.5			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
544	C ₄ H ₂ ClN ₂ O ₂	5, 5-Dichlorobarbituric acid.....	196.95	211 d.			
545	C ₄ H ₂ Cl ₂ O ₂	Fumaryl chloride ClOCCH:CHCOCl...	152.93		160	1.410	938
546	C ₄ H ₂ I ₂ S	Thiophene diiodide.....	335.94	40			
547	C ₄ H ₂ N ₂ O ₄	Alloxan OC(NHCO) ₂ CO.....	142.03	256 d.			
548	C ₄ H ₂ O ₃	Maleic anhydride (:CHCO) ₂ O.....	98.015	57	202	0.934	
549	C ₄ H ₂ O ₄	Acetylenedicarboxylic acid.....	114.02	179			
550	C ₄ H ₂ BrO ₄	Bromofumaric acid.....	194.94	186			
551	C ₄ H ₂ BrO ₄	Bromomaleic acid HO ₂ CCBr:CHCO ₂ H...	194.94	141			
552	C ₄ H ₂ ClN ₂ O ₂	5-Chlorobarbituric acid.....	162.50	295 s. d.			
553	C ₄ H ₂ NO ₂ S	2-Nitrothiophene.....	129.096	46.5	225		
554	C ₄ H ₂ N ₂ O ₄	Violuric acid.....	157.05	224 d.			
555	C ₄ H ₂ AsCl ₃	<i>bis</i> -2-Chlorovinyl chloroarsine.....	233.36		230	1.702	
556	C ₄ H ₂ BrNS	2-Bromoallyl isothiocyanate.....	178.02		200		
557	C ₄ H ₂ Br ₂ O ₄	1, 2-Dibromosuccinic acid.....	275.86	255			
558	C ₄ H ₂ Cl ₂ O ₂	Succinyl chloride (CH ₂ COCl) ₂	154.95	17	192	1.395	872
559	C ₄ H ₂ Cl ₂ O ₂	Chloroacetic anhydride (ClCH ₂ CO) ₂ O...	170.95	46	163 ¹¹⁶		
560	C ₄ H ₂ N ₂	Succinyl nitrile (CH ₂ CN) ₂	80.047	54.5	267	0.985 ^{48,1}	1097
561	C ₄ H ₂ N ₂	Pyridazine (1, 2-Diazine).....	80.047	-8	208	1.107	1015
562	C ₄ H ₂ N ₂	Pyrimidine (1, 3-Diazine).....	80.047	22	124		
563	C ₄ H ₂ N ₂	Pyrazine (1, 4-Diazine).....	80.047	53	118	1.031 ⁶¹	1091
564	C ₄ H ₂ N ₂ O ₂	Uracil —NHCONHCH:CHCO—.....	112.05	338			
565	C ₄ H ₂ N ₂ O ₂	Barbituric acid OC(NHCO) ₂ CH ₂	128.047	245	260 d.		
567	C ₄ H ₂ N ₄	Hydrocyanic acid (tetramer).....	108.063	179 d.			
568	C ₄ H ₂ O	Tetrollic aldehyde CH ₂ C:CCHO.....	68.031	-26	107	0.927 ¹⁷	913
569	C ₄ H ₂ O	Furfural (Furan).....	68.031		31	0.937	260
570	C ₄ H ₂ O ₂	Tetrollic acid CH ₂ C:CCO ₂ H.....	84.031	76.5	203		
571	C ₄ H ₂ O ₂	Succinic anhydride.....	100.031	119.6	261	1.104	
572	C ₄ H ₂ O ₂	Tetronic acid —OCH ₂ C(OH):CHCO—.....	100.03	141			
573	C ₄ H ₂ O ₄	Fumaric acid (:CHCO ₂ H) ₂	116.031	287	290	1.635	
574	C ₄ H ₂ O ₄	Maleic acid (:CHCO ₂ H) ₂	116.031	130.5	135 d.	1.590	
575	C ₄ H ₂ O ₄	Hydroxymaleic acid.....	132.03	152			
576	C ₄ H ₂ S	Thiophene.....	84.096	-40.0	85	1.065	693
577	C ₄ H ₂ BrO ₄	Bromosuccinic acid.....	196.95	159			
578	C ₄ H ₂ ClO	Crotonyl chloride CH ₃ CH:CHCOCl...	104.497		125	1.091	
579	C ₄ H ₂ ClO ₂	1-Chloro- α -crotonic acid.....	120.50	99			
580	C ₄ H ₂ ClO ₂	1-Chloro- β -crotonic acid.....	120.50	66			
581	C ₄ H ₂ ClO ₂	2-Chloro- β -crotonic acid.....	120.50	61			
582	C ₄ H ₂ Cl ₃ O	1, 1, 2-Trichlorobutyraldehyde.....	175.41		165.4	1.396	523
583	C ₄ H ₂ Cl ₃ O ₂	1, 1, 2-Trichlorobutyric acid.....	191.41	60	238		
584	C ₄ H ₂ Cl ₃ O ₂	1, 1, 3-Trichlorobutyric acid.....	191.41	75			
585	C ₄ H ₂ Cl ₃ O ₂	Ethyl trichloroacetate Cl ₃ CCO ₂ C ₂ H ₅ ...	191.41		168	1.383	437
586	C ₄ H ₂ F ₃ O ₂	Ethyl trifluoroacetate F ₃ CCO ₂ C ₂ H ₅ ...	142.039		61.7	1.195 ¹⁸	1
587	C ₄ H ₂ N	Allyl cyanide CH ₂ :CHCH ₂ CN.....	67.047		116.1	0.832	212
588	C ₄ H ₂ N	Allyl isocyanide CH ₂ :CHCH ₂ NC.....	67.047		106	0.794 ¹⁷	
589	C ₄ H ₂ N	Pyrrrole.....	67.047		131	0.948	612
590	C ₄ H ₂ NO ₂	Ethyl cyanoformate NCCO ₂ C ₂ H ₅	99.047		116	1.013	
591	C ₄ H ₂ NO ₂	Methyl cyanoacetate NCCH ₂ CO ₂ CH ₃ ...	99.047		200	1.123 ¹⁸	
592	C ₄ H ₂ NO ₂	Succinimide.....	99.047	124	288	1.412 ¹⁶	1333
593	C ₄ H ₂ NS	Allyl thiocyanate CH ₂ :CHCH ₂ CNS....	99.112		161	1.050	
594	C ₄ H ₂ NS	Allyl isothiocyanate CH ₂ :CHCH ₂ CSN..	99.112	-100.0	150.7	1.010 ²⁰	687
595	C ₄ H ₂	1, 2-Butadiene CH ₂ :C:CHCH ₃	54.046		19		
596	C ₄ H ₂	1, 3-Butadiene CH ₂ :CHCH:CH ₂	54.046		-2.6		
597	C ₄ H ₂	Dimethylacetylene (CH ₃ C) ₂	54.046		28.9		
598	C ₄ H ₂	Ethylacetylene C ₂ H ₅ C:CH.....	54.046	-130	18.5	0.668 ⁹	101
599	C ₄ H ₂ As ₂ O ₄	Diarsenodiacetic acid.....	267.97	205 d.			
600	C ₄ H ₂ Br ₂ O ₂	Ethyl dibromoacetate Br ₂ CHCO ₂ C ₂ H ₅ ...	245.88		194	1.903	588
601	C ₄ H ₂ Br ₄	1, 1, 4, 4-Tetrabromobutane.....	373.71		145 ¹⁰	2.529	782
602	C ₄ H ₂ Br ₄	1, 2, 3, 4-Tetrabromobutane.....	373.71	19; 39	181 ⁶⁰		
603	C ₄ H ₂ Br ₄	2, 2, 3, 3-Tetrabromobutane.....	373.71	39	230		
604	C ₄ H ₂ Cl ₂ O ₂	Ethyl dichloroacetate.....	156.96		158.2	1.282	367
604.1	C ₄ H ₂ Cl ₂ O ₂	Methyl 1, 2-dichloropropionate.....	156.96		92 ⁶⁰	1.328	
605	C ₄ H ₂ Cl ₄ O	1, 2, 2, 2-Tetrachloroethyl ether.....	211.88		189.7	1.422	
606	C ₄ H ₂ N ₂	1-Methylimidazole.....	82.062	-6	199	1.036 ¹⁰	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
607	C ₄ H ₆ N ₂	4-Methylimidazole	82.062	56	262.9	1.008	
608	C ₄ H ₆ N ₂	1-Methylpyrazole	82.062		127	0.993 ₄ ⁴	828
608.1	C ₄ H ₆ N ₂	3-Methylpyrazole	82.062			1.020	898
608.2	C ₄ H ₆ N ₂	5-Methylpyrazole	82.062		204	1.022	
609	C ₄ H ₆ N ₂ O ₂	Ethyl diazoacetate	114.062	-22	59 ¹²	1.085 ^{17.6}	927
609.1	C ₄ H ₆ N ₂ O ₂ S	3-Methylpyrazole-4-sulfonic acid	162.22	258			1267
610	C ₄ H ₆ N ₄ O ₃	Allantoin	158.08	235			1328
611	C ₄ H ₆ N ₄ O ₁₂	Erythritol tetranitrate	302.08	61			
612	C ₄ H ₆ O	Methyl propargyl ether	70.046		62	0.83 ^{12.5}	
613	C ₄ H ₆ O	Vinyl ether (CH ₂ :CH) ₂ O	70.046		39		
614	C ₄ H ₆ O	Crotonaldehyde CH ₃ CH:CHCHO	70.046	-75	104	0.859 ₄ ⁴	361
615	C ₄ H ₆ O	Dimethylketene (CH ₃) ₂ C:CO	70.046	-97.5	34.3		
616	C ₄ H ₆ O ₂	Succinic dialdehyde (CH ₂ CHO) ₂	86.046		57 ¹⁰	1.064	290
617	C ₄ H ₆ O ₂	α-Crotonic acid CH ₃ CH:CHCO ₂ H	86.046	72	185	0.964 ^{7.9.7}	1112
619	C ₄ H ₆ O ₂	β-Crotonic acid CH ₂ :C(CH ₃)CO ₂ H	86.046	14.6	171.9 d.	1.027	411
620	C ₄ H ₆ O ₂	1-Methylacrylic acid	86.046	16	163	1.015	333
621	C ₄ H ₆ O ₂	Trimethylenecarboxylic acid	86.046	17	182.5	1.088	
622	C ₄ H ₆ O ₂	Vinylacetic acid CH ₂ :CHCH ₂ CO ₂ H	86.046	-39	163	1.013 ₁₅ ¹⁵	849
623	C ₄ H ₆ O ₂	Allyl formate HCO ₂ C ₃ H ₅	86.046		83	0.948 ₁₅ ¹⁵	
624	C ₄ H ₆ O ₂	Methyl acrylate CH ₂ :CHCO ₂ CH ₃	86.046		80.5	0.956 ₁₅ ¹⁵	113
625	C ₄ H ₆ O ₂	Diacetyl CH ₃ COCOCH ₃	86.046		88	0.975	85
626	C ₄ H ₆ O ₂	Acetic anhydride (CH ₃ CO) ₂ O	102.046	-73.0	139.6	1.082	81
627	C ₄ H ₆ O ₂	1-Ketobutyric acid C ₂ H ₅ COCO ₂ H	102.046	32	85 ²¹		
628	C ₄ H ₆ O ₂	Methyl pyruvate CH ₃ COCO ₂ CH ₃	102.046		137	1.154 ⁰	
629	C ₄ H ₆ O ₂	Succinic acid (CH ₂ CO ₂ H) ₂	118.046	185	235	1.562	1220
630	C ₄ H ₆ O ₄	Isosuccinic acid CH ₃ CH(CO ₂ H) ₂	118.046	135		1.455	
631	C ₄ H ₆ O ₄	Dimethyl oxalate (CO ₂ CH ₃) ₂	118.046	54.0	163.3	1.120 ₈₂ ⁸²	1122
632	C ₄ H ₆ O ₄	Ethyl hydrogen oxalate HO ₂ CCO ₂ C ₂ H ₅	118.046		117 ¹⁵	1.218	
633	C ₄ H ₆ O ₄	Diglycollic acid O(CH ₂ CO ₂ H) ₂	134.05	148			
634	C ₄ H ₆ O ₄	Glycollic anhydride (CH ₂ OHCO) ₂ O	134.05	130			
635	C ₄ H ₆ O ₄	l-Malic acid HO ₂ CCH ₂ CH(OH)CO ₂ H	134.05	100	140 d.	1.595	
636	C ₄ H ₆ O ₄	d-Malic acid	134.05	129	150 d.	1.601	
637	C ₄ H ₆ O ₄	Isomalic acid CH ₃ C(OH)(CO ₂ H) ₂	134.05	160 d.			
638	C ₄ H ₆ O ₆	Mesotartaric acid	150.05	140		1.666	1224
639	C ₄ H ₆ O ₆	d-Tartaric acid	150.05	170		1.760	1222
640	C ₄ H ₆ O ₆	d-Tartaric acid	150.05	206		1.687	
641	C ₄ H ₆ O ₆	Dihydroxytartaric acid	182.05	114			
642	C ₄ H ₆ S	Divinyl sulfide (CH ₂ :CH) ₂ S	86.111		101	0.912	
643	C ₄ H ₇ Br	Vinylethyl bromide CH ₂ :CHCH ₂ CH ₂ Br	134.97		99.0		
644	C ₄ H ₇ BrO	Bromomethyl ethyl ketone	150.97		146		
645	C ₄ H ₇ BrO ₂	1-Bromobutyric acid C ₂ H ₅ CHBrCO ₂ H	166.97	-4	115 ²⁰	1.574 ₁₅ ¹⁵	
646	C ₄ H ₇ BrO ₂	2-Bromobutyric acid	166.97	18	122 ¹⁶		
647	C ₄ H ₇ BrO ₂	3-Bromobutyric acid	166.97	32			
648	C ₄ H ₇ BrO ₂	1-Bromoethyl acetate	166.97		63 ³⁹	1.4620	395
648.1	C ₄ H ₇ BrO ₂	2-Bromoethyl acetate	166.97		70 ²⁷	1.5140	450
648.2	C ₄ H ₇ BrO ₂	Ethyl bromoacetate BrCH ₂ CO ₂ C ₂ H ₅	166.97		159	1.514 ₁₅ ¹⁵	438
648.3	C ₄ H ₇ BrO ₂	Methyl 1-bromopropionate	166.97		68.5 ⁴⁸	1.4917	436
648.4	C ₄ H ₇ BrO ₂	Methyl 2-bromopropionate	166.97		79 ³⁶	1.5192	460
649	C ₄ H ₇ Br ₃	1, 2, 3-Tribromobutane	294.80		113 ¹⁹	2.190	752
650	C ₄ H ₇ BrO	1, 1, 1-Tribromo-tert.-butyl alcohol	310.80	176			
651	C ₄ H ₇ ClO	Butyryl chloride C ₃ H ₇ COCl	106.51	-89.0	102	1.028	194
652	C ₄ H ₇ ClO	Isobutyryl chloride (CH ₃) ₂ CHCOCl	106.51	-90.0	92	1.017	168
653	C ₄ H ₇ ClO ₂	1-Chlorobutyric acid C ₂ H ₅ CHClCO ₂ H	122.51		101.3 ¹⁵		
654	C ₄ H ₇ ClO ₂	d-2-Chlorobutyric acid	122.51	44	100 ¹³		
655	C ₄ H ₇ ClO ₂	d-2-Chlorobutyric acid	122.51	16.5	116 ²²	1.186	386
656	C ₄ H ₇ ClO ₂	3-Chlorobutyric acid	122.51	16	196 ²²	1.250 ¹⁰	
657	C ₄ H ₇ ClO ₂	1-Chloroethyl acetate	122.51		46 ³⁵	1.1124	190
657.1	C ₄ H ₇ ClO ₂	2-Chloroethyl acetate	122.51		145	1.178 ⁰	285
658	C ₄ H ₇ ClO ₂	Ethyl chloroacetate ClCH ₂ CO ₂ C ₂ H ₅	122.51		144.2	1.159	267
659	C ₄ H ₇ ClO ₂	Methyl 2-chloropropionate	122.51		148	1.187	
660	C ₄ H ₇ ClO ₃	n-Propyl chloroformate ClCO ₂ C ₃ H ₇	122.51		116	1.083 ₁₅ ¹⁵	
661	C ₄ H ₇ Cl ₃ O	1, 2, 2-Trichloroethyl ethyl ether	177.43		170	1.330 ¹⁴	
662	C ₄ H ₇ Cl ₃ O	1, 1, 1-Trichloro-tert.-butyl alcohol	177.43	97	166.4		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
663	C ₄ H ₇ ClO ₂	Chloral alcoholate Cl ₂ CCHO.C ₂ H ₅ OH..	193.43	55	115	1.143 ⁴⁰	
664	C ₄ H ₇ Cl ₃ O ₂	1, 1, 2-Trichlorobutyraldehyde hydrate..	193.43	78		1.694 ⁴	
665	C ₄ H ₇ FO ₂	Ethyl fluoroacetate FCH ₂ CO ₂ C ₂ H ₅	106.054			1.093	33
666	C ₄ H ₇ IO ₂	Ethyl iodoacetate ICH ₂ CO ₂ C ₂ H ₅	213.99		180	1.817 ^{12,7}	618
667	C ₄ H ₇ N	n-Butyronitrile C ₄ H ₇ CN.....	69.062	-112.6	118	0.794	47
668	C ₄ H ₇ N	Isobutyronitrile (CH ₃) ₂ CHCN	69.062		108		
669	C ₄ H ₇ N	Isopropylisocyanide (CH ₃) ₂ CHNC.....	69.062		87	0.760	
670	C ₄ H ₇ N	Pyrraline.....	69.062		91	0.910	
671	C ₄ H ₇ NO	Acetonecyanhydrin (CH ₃) ₂ C(OH)CN...	85.062	-19	82 ²³	0.932 ¹⁹	117
672	C ₄ H ₇ NO	α-Pyrrolidone.....	85.062	25	250.8	1.116	
673	C ₄ H ₇ NO ₂	Diacetamide NH(COCH ₃) ₂	101.062	78	223.5		
674	C ₄ H ₇ NO ₂	Diacetylmonoxime CH ₃ COC(:NOH)CH ₃	101.062	74	186		
675	C ₄ H ₇ NO ₂ S	Ethyl thiooxamate H ₂ NCSCOC ₂ H ₅	133.13	63			
676	C ₄ H ₇ NO ₂	Acetylaminoacetic acid.....	117.062	206			
677	C ₄ H ₇ NO ₂	Diacetohydroxamic acid.....	117.06	89			
678	C ₄ H ₇ NO ₂	Ethyl oxamate H ₂ NCO.CO ₂ C ₂ H ₅	117.06	115			
679	C ₄ H ₇ NO ₄	L-Aspartic acid.....	133.06	270		1.661 ^{12,4}	
679.1	C ₄ H ₇ NO ₇	Nitrotetronic acid dihydrate.....	181.06	d. 184		1.684	1190
680	C ₄ H ₇ NO ₈	Ammonium tetraoxalate.....	197.06	130.5		1.607	
681	C ₄ H ₇ NS	Propyl isothiocyanate.....	101.127		153	0.991	
682	C ₄ H ₇ N ₂ O	Creatinine.....	113.078	260 d.			
683	C ₄ H ₈	Cyclobutane (CH ₂) ₄	56.062	-50	13	0.703 ⁹	801
684	C ₄ H ₈	1, 1-Dimethylethylene CH ₂ :C(CH ₃) ₂ ...	56.062		-6		
685	C ₄ H ₈	1, 2-Dimethylethylene CH ₃ CH:CHCH ₃	56.062		1.4		
686	C ₄ H ₈	Ethylethylene C ₂ H ₅ CH:CH ₂	56.062	-130	-18	0.668 ⁹	102
687	C ₄ H ₈	Methylcyclopropane (CH ₂) ₂ CHCH ₃ ...	56.062		5	0.691 ⁻²⁰	
688	C ₄ H ₈ Br ₂	1, 2-Dibromobutane C ₂ H ₅ CHBrCH ₂ Br.	215.89		166	1.820	
689	C ₄ H ₈ Br ₂	1, 3-Dibromobutane.....	215.89		174	1.807	632
690	C ₄ H ₈ Br ₂	1, 4-Dibromobutane Br(CH ₂) ₄ Br.....	215.89	-20	198 d.	1.79 ¹⁶	
691	C ₄ H ₈ Br ₂	2, 3-Dibromobutane CH ₃ (CHBr) ₂ CH ₃ ..	215.89		158	1.83 ⁹	
693	C ₄ H ₈ Br ₂	1, 2-Dibromo-2-methylpropane.....	215.89	-70.3	149.0	1.759	639
694	C ₄ H ₈ Br ₂ S	Di-(1-bromoethyl) sulfide.....	247.96		87 ¹⁶	1.742	
695	C ₄ H ₈ Cl ₂	1, 2-Dichloro-2-methylpropane.....	126.98		108		
696	C ₄ H ₈ Cl ₂ O	2-Chloroethyl ether (ClCH ₂ CH ₂) ₂ O....	142.98		178	1.213 ²⁰	461
697	C ₄ H ₈ Cl ₂ O	1, 2-Dichloroethyl ethyl ether.....	142.98		145	1.174 ²³	
697.1	C ₄ H ₈ Cl ₂ O ₂	Dichlorobutylene glycol.....	158.98	126			1177
698	C ₄ H ₈ Cl ₂ S	Di-(1-chloroethyl) sulfide.....	159.04		67.5 ²⁷	1.199 ¹⁴	
699	C ₄ H ₈ Cl ₂ S	Di-(2-chloroethyl) sulfide (CH ₂ CHCl) ₂ S	159.04	13.5	120 ²⁴	1.285 ¹⁶	701
700	C ₄ H ₈ Cl ₂ OS	Di-(2-chloroethyl) sulfoxide.....	175.04	110	140 ²⁸ d.		
701	C ₄ H ₈ Cl ₂ O ₂ S	Di-(2-chloroethyl) sulfone.....	191.04	53.5	181 ¹⁵		
702	C ₄ H ₈ N ₂	2-Methyl-4, 5-dihydroimidazole.....	84.078	106	198		
703	C ₄ H ₈ N ₂ O ₂	1-Acetyl-2-methylurea.....	116.08	180			
704	C ₄ H ₈ N ₂ O ₂	Dimethyloxamide (CONHCH ₃) ₂	116.08	210			
705	C ₄ H ₈ N ₂ O ₂	Dimethylglyoxime.....	116.08	246			
706	C ₄ H ₈ N ₂ O ₂	Succinamide (CH ₂ CONH ₂) ₂	116.078	243			
707	C ₄ H ₈ N ₂ O ₂	Ethyl allophanate H ₂ NCONHCO ₂ C ₂ H ₅	132.08	192			
708	C ₄ H ₈ N ₂ O ₂	L-Asparagine.....	132.08	226	235 d.	1.543 ¹⁵	1254
709	C ₄ H ₈ N ₂ O ₄	d-Tartaramide [CH(OH)CONH ₂] ₂	148.08	195			
710	C ₄ H ₈ N ₂ S	Allylthiourea CH ₂ :CHCH ₂ NHCONH ₂ ..	116.143	78.4		1.219 ²⁰	
711	C ₄ H ₈ O	Crotonyl alcohol CH ₂ CH:CHCH ₂ OH...	72.062	> -30	118	0.854	276
712	C ₄ H ₈ O	Cyclobutanol (CH ₂) ₃ CHOH.....	72.062		124.1	0.923 ¹¹	343
713	C ₄ H ₈ O	Cyclopropyl carbinol (CH ₂) ₂ CHCH ₂ OH	72.062		124.3	0.899	850
714	C ₄ H ₈ O	Vinylethyl alcohol CH ₂ :CHCH ₂ CH ₂ OH	72.062		114	0.856 ⁹	
715	C ₄ H ₈ O	Methyl allyl ether CH ₂ :CHCH ₂ OCH ₃ ..	72.062		46	0.77 ¹¹	
716	C ₄ H ₈ O	Vinyl ethyl ether CH ₂ :CHOC ₂ H ₅	72.062		35.5	0.763 ^{14,17}	
717	C ₄ H ₈ O	n-Butyraldehyde C ₄ H ₇ CHO.....	72.062	-99.0	75.7	0.817	50
718	C ₄ H ₈ O	Isobutyraldehyde (CH ₃) ₂ CHCHO.....	72.062	-65.9	61	0.794	30
719	C ₄ H ₈ O	Methyl ethyl ketone CH ₃ COC ₂ H ₅	72.062	-86.4	79.6	0.805	40
720	C ₄ H ₈ O ₂	Erythrol.....	88.062		196.5	1.047	
721	C ₄ H ₈ O ₂	Methylacetyl carbinol (Acetoin).....	88.062	15	142	1.002 ¹⁶	303
722	C ₄ H ₈ O ₂	2-Hydroxybutyraldehyde (Aldol).....	88.062		83 ²⁰	1.103	
723	C ₄ H ₈ O ₂	n-Butyric acid C ₄ H ₇ CO ₂ H.....	88.062	-7.9	163.5	0.959	109
724	C ₄ H ₈ O ₂	Isobutyric acid (CH ₃) ₂ CHCO ₂ H.....	88.062	-47.0	154.4	0.949	88

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
725	C ₄ H ₈ O ₂	Ethyl acetate CH ₃ COC ₂ H ₅	88.062	-83.6	77.1	0.899	29
726	C ₄ H ₈ O ₂	Methyl propionate C ₃ H ₇ CO ₂ CH ₃	88.062	-87.5	79.9	0.917	36
727	C ₄ H ₈ O ₂	<i>n</i> -Propyl formate HCO ₂ C ₃ H ₇	88.062	-92.9	81.3	0.901	35
728	C ₄ H ₈ O ₂	Isopropyl formate HCO ₂ CH(CH ₃) ₂	88.062		71.3	0.883 ^o	
729	C ₄ H ₈ O ₃	Ethoxyacetic acid C ₂ H ₅ OCH ₂ CO ₂ H....	104.062		206		
730	C ₄ H ₈ O ₃	1-Hydroxybutyric acid.....	104.062	42.5	260		
731	C ₄ H ₈ O ₃	1-Hydroxyisobutyric acid.....	104.062	79	212		
732	C ₄ H ₈ O ₃	2-Hydroxybutyric acid.....	104.062		130 ¹⁴		
733	C ₄ H ₈ O ₃	Ethyl glycolate HOCH ₂ CO ₂ C ₂ H ₅	104.062		160	1.083 ²²	
734	C ₄ H ₈ O ₃	Glycol acetate HOCH ₂ CH ₂ OCOCH ₃	104.062		182		
735	C ₄ H ₈ O ₃	Methylethyl carbonate CH ₃ (C ₂ H ₅)CO ₂ ...	104.062	-14.5	109.2	1.002 ²⁷	
736	C ₄ H ₈ O ₃	Methyl hydracrylate.....	104.062		79 ¹²	1.118	336
737	C ₄ H ₈ O ₃	Methyl lactate CH ₃ CH(OH)CO ₂ CH ₃ ...	104.062		144.8	1.08 ¹⁶	883
738	C ₄ H ₈ O ₄	1, 2-Dihydroxybutyric acid.....	120.06	75			
739	C ₄ H ₈ O ₄	<i>d</i> -Methyl glycerinate.....	120.06		120 ¹⁴	1.280 ¹⁵	
740	C ₄ H ₈ S ₂	Diethylene disulfide.....	120.192	112	200		
741	C ₄ H ₉ Br	<i>n</i> -Butyl bromide C ₄ H ₉ Br.....	136.99	-112.4	101.6	1.275	372
742	C ₄ H ₉ Br	Isobutyl bromide (CH ₃) ₂ CHCH ₂ Br....	136.99	-118.5	91.5	1.264	352
743	C ₄ H ₉ Br	<i>sec</i> -Butyl bromide C ₂ H ₅ CHBrCH ₃	136.99		91.3	1.251 ¹⁸	347
744	C ₄ H ₉ Br	<i>tert</i> -Butyl bromide (CH ₃) ₃ CBr.....	136.99	-20	73.3	1.222	309
745	C ₄ H ₉ BrO	2-Bromoethyl ethyl ether.....	152.99		128.2	1.370 ^o	
746	C ₄ H ₉ Cl	<i>n</i> -Butyl chloride C ₄ H ₉ Cl.....	92.527	-123.1	78.0	0.884	132
747	C ₄ H ₉ Cl	Isobutyl chloride (CH ₃) ₂ CHCH ₂ Cl....	92.527	-131.2	68.9	0.875	98
748	C ₄ H ₉ Cl	<i>sec</i> -Butyl chloride C ₂ H ₅ CHClCH ₃	92.527		68	0.871	110
749	C ₄ H ₉ Cl	<i>tert</i> -Butyl chloride (CH ₃) ₃ CCl.....	92.527	-28.5	51.0	0.840	60
751	C ₄ H ₉ ClO	1-Chloroethyl ethyl ether.....	108.527		98		
752	C ₄ H ₉ ClO	<i>tert</i> -Butyl hypochlorite (CH ₃) ₃ CClO....	108.527		80	0.958	
753	C ₄ H ₉ ClS	2-Chloroethyl ethyl sulfide.....	124.59		157		
754	C ₄ H ₉ I	<i>n</i> -Butyl iodide C ₄ H ₉ I.....	184.00	-103.5	127	1.617	600
755	C ₄ H ₉ I	Isobutyl iodide (CH ₃) ₂ CHCH ₂ I.....	184.00	-93.5	120.4	1.605	578
756	C ₄ H ₉ I	<i>sec</i> -Butyl iodide C ₂ H ₅ CHICH ₃	184.00	-104.0	117.5	1.595	
757	C ₄ H ₉ IO	2-Iodoethyl ethyl ether C ₂ H ₅ OCH ₂ CH ₂ I	200.00		155	1.670	
758	C ₄ H ₉ N	Crotonylamine CH ₃ CH:CHCH ₂ NH ₂	71.077		81		
759	C ₄ H ₉ N	Tetrahydropyrrole (Pyrrolidine).....	71.077		88.5	0.871 ¹⁰	
760	C ₄ H ₉ NO	<i>n</i> -Butyramide C ₃ H ₇ CONH ₂	87.077	116	216	1.032	
761	C ₄ H ₉ NO	Isobutyramide (CH ₃) ₂ CHCONH ₂	87.077	129	220	1.013	
762	C ₄ H ₉ NO	<i>N</i> -Dimethylacetamide CH ₃ CON(CH ₃) ₂ ...	87.077		165.7	0.943	365
763	C ₄ H ₉ NO	<i>N</i> -Ethylacetamide CH ₃ CONHC ₂ H ₅	87.077		205	0.942	
764	C ₄ H ₉ NO	Methyl ethyl ketoxime.....	87.077		152	0.923	393
765	C ₄ H ₉ NO ₂	Iminoethyl alcohol HN(CHCH ₂ O) ₂ H ₂ ...	103.077	28	270		
766	C ₄ H ₉ NO ₂	1-Aminobutyric acid.....	103.077	285			
767	C ₄ H ₉ NO ₂	2-Aminobutyric acid.....	103.077	184			
768	C ₄ H ₉ NO ₂	3-Aminobutyric acid.....	103.08	193			
769	C ₄ H ₉ NO ₂	1-Aminoisobutyric acid.....	103.077		280		
770	C ₄ H ₉ NO ₂	Ethylaminoacetic acid.....	103.08	> 160			
771	C ₄ H ₉ NO ₂	Propyl carbamate C ₃ H ₇ OCONH ₂	103.077	53	200		
772	C ₄ H ₉ NO ₂	<i>n</i> -Butyl nitrite C ₄ H ₉ ONO.....	103.077		75	0.911 ^o	
773	C ₄ H ₉ NO ₂	Isobutyl nitrite (CH ₃) ₂ CHCH ₂ ONO....	103.077		67	0.877 ¹⁴	28
773.1	C ₄ H ₉ NO ₂	Methy urethane CH ₃ NHCO ₂ C ₂ H ₅	103.077		170	1.009 ^{14,9}	950
774	C ₄ H ₉ NO ₂	<i>n</i> -Butyl nitrate C ₄ H ₉ ONO ₂	119.077		136	1.048 ^o	
775	C ₄ H ₉ NO ₂	Isobutyl nitrate (CH ₃) ₂ CHCH ₂ ONO ₂ ...	119.077		122.9	1.014 ¹⁵	137
776	C ₄ H ₉ NO ₃	<i>d</i> -Ammonium hydrogen malate.....	151.077	170			1205
777	C ₄ H ₉ NO ₃	<i>l</i> -Ammonium hydrogen malate.....	151.077	161		1.509	
778	C ₄ H ₉ NO ₃	Ammonium hydrogen tartrate.....	167.077	d.		1.680	1241
779	C ₄ H ₉ NS	1, 4-Thiazan.....	103.142		169		
780	C ₄ H ₉ N ₂ O ₂	Creatine.....	131.093	295			
781	C ₄ H ₁₀ ClNO ₂	Ethylaminoacetic acid hydrochloride....	139.54	144			
781.1	C ₄ H ₁₀	<i>n</i> -Butane CH ₃ CH ₂ CH ₂ CH ₃	58.077	-135.0	0.6	0.601 ^o (liq.)	
781.2	C ₄ H ₁₀	Trimethylmethane (Isobutane).....	58.077	-145.0	-10.2		
782	C ₄ H ₁₀ N ₂	Diethylenediamine (Piperazine).....	86.093	105.6	146		1156
783	C ₄ H ₁₀ N ₂ O	Nitrosodiethylamine (C ₂ H ₅) ₂ NNO.....	102.093		175.4	0.951 ^{17,5}	
784	C ₄ H ₁₀ N ₂ O	Trimethylurea (CH ₃) ₃ NCONHCH ₃	102.093	75.5	232.5		
785	C ₄ H ₁₀ N ₂ S	Propylthiourea C ₃ H ₇ NHCSNH ₂	118.16	110			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
786	C ₄ H ₁₀ N ₃ O ₂	Guanidine lactate.....	132.10	d.			1236
788	C ₄ H ₁₀ N ₄ S ₂	Ethylenediamine thiocyanate.....	178.24				1285
789	C ₄ H ₁₀ O	<i>n</i> -Butyl alcohol C ₄ H ₉ OH.....	74.077	-89.8	117.7	0.810	116
790	C ₄ H ₁₀ O	Isobutyl alcohol (CH ₃) ₂ CHCH ₂ OH.....	74.077	-108	107.3	0.802	99
791	C ₄ H ₁₀ O	<i>sec</i> .-Butyl alcohol C ₂ H ₅ CH(OH)CH ₃	74.077		99.5	0.808	104
792	C ₄ H ₁₀ O	<i>tert</i> .-Butyl alcohol (CH ₃) ₃ COH.....	74.077	25.5	82.8	0.789	64
793	C ₄ H ₁₀ O	Ether (C ₂ H ₅) ₂ O.....	74.077	{ α-116.3 β-123.3	34.5	0.714	7
794	C ₄ H ₁₀ O	Methyl propyl ether CH ₃ OC ₃ H ₇	74.077		38.9	0.738	13
794.1	C ₄ H ₁₀ O	Methyl isopropyl ether.....	74.077		32.5 ⁷⁷⁷	0.735 ²⁰	12
795	C ₄ H ₁₀ O ₂	1, 4-Dihydroxybutane (CH ₂ CH ₂ OH) ₂ ...	90.077	16	230	1.020	
796	C ₄ H ₁₀ O ₂	2, 3-Dihydroxybutane (CH ₂ CHOH) ₂ ...	90.077		184	1.048 ⁹	
797	C ₄ H ₁₀ O ₂	1, 2-Dihydroxy-2-methylpropane.....	90.077		177	1.003	
798	C ₄ H ₁₀ O ₂	Glycol dimethyl ether (CH ₃ OCH ₂) ₂ ...	90.077		84.5	0.873	
799	C ₄ H ₁₀ O ₂	Glycol ethyl ether HOCH ₂ CH ₂ OC ₂ H ₅ ...	90.077		135.3	0.935	
800	C ₄ H ₁₀ O ₂	Diethyl peroxide (C ₂ H ₅ O) ₂	90.077		65	0.827	
801	C ₄ H ₁₀ O ₂	Dimethyl acetal CH ₃ CH(OCH ₂) ₂	90.077		64.4	0.866	
802	C ₄ H ₁₀ O ₂ S	Ethyl sulfone (C ₂ H ₅) ₂ SO ₂	122.142	70	248	1.357	
803	C ₄ H ₁₀ O ₂ S ₂	Diethyl disulfoxide C ₂ H ₅ (SO) ₂ C ₂ H ₅ ...	154.21		140 d.	1.24	
804	C ₄ H ₁₀ O ₃	1, 2, 3-Trihydroxybutane.....	106.077		136 ²⁸	1.232 ¹⁷	
805	C ₄ H ₁₀ O ₃	Di-(2-hydroxyethyl) ether.....	106.077		250	1.132	
806	C ₄ H ₁₀ O ₃	Glycerol 1-methyl ether.....	106.077		197	1.270 ²⁵	
807	C ₄ H ₁₀ O ₃ S	Diethyl sulfite (C ₂ H ₅) ₂ SO ₃	138.14		161.3	1.077	811
808	C ₄ H ₁₀ O ₄	<i>dl</i> -Erythritol HOCH ₂ (CHOH) ₂ CH ₂ OH...	122.08	126	331	1.451	1174
809	C ₄ H ₁₀ O ₄ S	Diethyl sulfate (C ₂ H ₅ O) ₂ SO ₂	154.14	-26.0	208 s. d.	1.172 ²⁵	78
810	C ₄ H ₁₀ S	<i>n</i> -Butyl mercaptan C ₄ H ₉ SH.....	90.142	> -74	98	0.836 ²⁰	
811	C ₄ H ₁₀ S	Isobutyl mercaptan (CH ₃) ₂ CHCH ₂ SH...	90.142	< -79	88	0.836	368
812	C ₄ H ₁₀ S	<i>sec</i> .-Butyl mercaptan C ₂ H ₅ CH(SH)CH ₃ ...	90.142		85	0.830 ¹⁷	
813	C ₄ H ₁₀ S	<i>tert</i> .-Butyl mercaptan (CH ₃) ₃ CSH.....	90.142		67		
814	C ₄ H ₁₀ S	Ethyl sulfide (C ₂ H ₅) ₂ S.....	90.142	-102.1	91.6	0.837	390
815	C ₄ H ₁₀ S ₂	Ethyl disulfide (C ₂ H ₅ S) ₂	122.21		153.5	0.993	630
816	C ₄ H ₁₀ Se	Ethyl selenide (C ₂ H ₅) ₂ Se.....	137.28		108	1.230 ^{27.5}	1035
817	C ₄ H ₁₀ Te	Ethyl telluride (C ₂ H ₅) ₂ Te.....	185.58		138		
818	C ₄ H ₁₁ AsO ₃	Diethylarsonic acid (C ₂ H ₅) ₂ AsO(OH)...	166.05	190			
819	C ₄ H ₁₁ AsO ₃	<i>N</i> -Butylarsonic acid C ₄ H ₉ AsO(OH) ₂ ...	182.05	159			
820	C ₄ H ₁₁ N	<i>n</i> -Butylamine C ₄ H ₉ NH ₂	73.093	-50.5	76	0.740 ²⁰	131
821	C ₄ H ₁₁ N	Isobutylamine (CH ₃) ₂ CHCH ₂ NH ₂	73.093	-85.5	68	0.736	111
822	C ₄ H ₁₁ N	<i>sec</i> .-Butylamine C ₂ H ₅ CH(NH ₂)CH ₃ ...	73.093	-104.5	63	0.718 ²⁰	93
823	C ₄ H ₁₁ N	<i>tert</i> .-Butylamine (CH ₃) ₃ CNH ₂	73.093	-67.5	43.8	0.696	39
824	C ₄ H ₁₁ N	Diethylamine (C ₂ H ₅) ₂ NH.....	73.093	-50.0	56.0	0.711	65
825	C ₄ H ₁₁ P	Diethylphosphine (C ₂ H ₅) ₂ PH.....	90.109		85		
826	C ₄ H ₁₂ As ₂	Cacodyl (CH ₃) ₂ As.As(CH ₃) ₂	210.01	-6	170	> 1	
827	C ₄ H ₁₂ As ₂ O	Cacodylic oxide [(CH ₃) ₂ As] ₂ O.....	226.01	-25	120	1.462 ¹⁶	
828	C ₄ H ₁₂ As ₂ S	Cacodylic sulfide [(CH ₃) ₂ As] ₂ S.....	242.08		211		
829	C ₄ H ₁₂ BrN	Tetramethylammonium bromide.....	154.02			1.56	
830	C ₄ H ₁₂ BrNO	Diethylbromoacetamide.....	170.02	67			
831	C ₄ H ₁₂ ClN	Diethylamine hydrochloride.....	109.56	217	330	1.048	
832	C ₄ H ₁₂ ClN	Tetramethylammonium chloride.....	109.56			1.169	
833	C ₄ H ₁₂ N ₂	Tetramethylenediamine.....	88.108	27	158		
834	C ₄ H ₁₂ N ₂ O ₄	Ammonium succinate.....	152.11			1.367 ¹⁰	
835	C ₄ H ₁₂ N ₂ O ₆	Ammonium <i>d</i> -tartrate.....	184.11	d.		1.608	1253
835.1	C ₄ H ₁₂ N ₂ O ₆	Ammonium <i>dl</i> -tartrate.....	184.11			1.601	1323
836	C ₄ H ₁₂ N ₄	Tetramethylammonium trinitride.....	116.124	125 d.			
837	C ₄ H ₁₂ OS	Dimethylethylsulfonium hydroxide.....	108.15	-99.5	93	0.837	
838	C ₄ H ₁₂ NO	Tetramethylammonium hydroxide.....	91.108	63	d.		
839	C ₄ H ₁₆ N ₆ O ₄ S	Methylguanidine sulfate.....	244.24	240			
840	C ₅ HCl ₃ N ₄	2, 6, 8-Trichloropyridine.....	223.41	187			
841	C ₅ HCl ₄ N	2, 3, 4, 5-Tetrachloropyridine.....	216.85	21	137 ²⁴		
842	C ₅ HCl ₄ N	2, 3, 4, 6-Tetrachloropyridine.....	216.85	75	135 ²⁰		
843	C ₅ HCl ₄ N	2, 3, 5, 6-Tetrachloropyridine.....	216.85	91	130 ²⁰		
844	C ₅ H ₂ Cl ₃ N	2, 3, 5-Trichloropyridine.....	182.40	50	120 ¹⁶		
845	C ₅ H ₂ Cl ₂ N	3, 5-Dichloropyridine.....	147.95	67			
846	C ₅ H ₃ N ₃	1, 1, 1-Tricyanoethane CH ₃ C(CN) ₃	105.05	93.5		0.760	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
847	C ₅ H ₄ BrN	3-Bromopyridine.....	157.96		173	1.632 ¹⁰	
848	C ₅ H ₄ ClN	2-Chloropyridine.....	113.50		167.5	1.205 ¹⁴	
849	C ₅ H ₄ ClN	3-Chloropyridine.....	113.50		148.5		
850	C ₅ H ₄ ClN	4-Chloropyridine.....	113.50		148		
851	C ₅ H ₄ N ₂	Glutaconic nitrile NCCH ₂ CH:CHCN..	92.047	31.5	130 ¹²		
852	C ₅ H ₄ N ₂ O ₂	3-Nitropyridine.....	124.05	41	216		
853	C ₅ H ₄ N ₂ O ₄	Methylalloxan.....	156.05	156 d.			
853.1	C ₅ H ₄ N ₂ O ₄ (H ₂ O)	3, 5-Pyrazoledicarboxylic acid.....	156.05			1.626	1239
854	C ₅ H ₄ N ₄	Purine.....	120.06	217			
855	C ₅ H ₄ N ₄ O	Hypoxanthine.....	136.06	> 150			
857	C ₅ H ₄ N ₄ O ₂	Uric acid.....	168.06	d.		1.893	
858	C ₅ H ₄ OS	Thiophene-2-aldehyde.....	112.10		198	1.215	
859	C ₅ H ₄ O ₂	Furfural.....	96.031	-38.7	161.7	1.159	685
860	C ₅ H ₄ O ₂	1, 4-Pyrone.....	96.031	32.5	217.7	1.190 ^{40, 3}	1063
861	C ₅ H ₄ O ₂ S	Thiophene-2-carboxylic acid.....	128.10	126.5	260 d.		
862	C ₅ H ₄ O ₂ S	Thiophene-3-carboxylic acid.....	128.10	136			
863	C ₅ H ₄ O ₂	Citraconic anhydride.....	112.03	7	228	1.245	508
864	C ₅ H ₄ O ₂	Glutaconic anhydride.....	112.03	87	152 ¹⁴		
865	C ₅ H ₄ O ₂	Itaconic anhydride.....	112.03	68			
866	C ₅ H ₄ O ₂	Pyromeconic acid.....	112.03	117	228		
867	C ₅ H ₄ O ₂	Pyromucic acid.....	112.03	133			
868	C ₅ H ₄ O ₄	Aconic acid.....	128.03	164			1324
869	C ₅ H ₄ O ₄	Glutinic acid HO ₂ CC:CCH ₂ CO ₂ H.....	128.03	146			
870	C ₅ H ₅ N	Pyridine.....	79.047	-42	115.3	0.982	641
871	C ₅ H ₅ NO	2-Hydroxypyridine.....	95.047	107	281		
872	C ₅ H ₅ NO	3-Hydroxypyridine HOC ₄ H ₄ N.....	95.047	129			
873	C ₅ H ₅ NO	4-Hydroxypyridine.....	95.047	148.5			
874	C ₅ H ₅ NO	Pyrrrole-2-aldehyde CHOC ₄ H ₄ N.....	95.047	47			
875	C ₅ H ₅ NO ₂	2, 4-Dihydroxypyridine (HO) ₂ C ₄ H ₃ N...	111.05	265			
876	C ₅ H ₅ NO ₂	2, 6-Dihydroxypyridine (HO) ₂ C ₄ H ₃ N...	111.05	195			
877	C ₅ H ₅ NO ₂	Pyrrrole-2-carboxylic acid HO ₂ C.C ₄ H ₄ N..	111.05	191.5			
878	C ₅ H ₅ NO ₂	2, 4, 6-Trihydroxypyridine.....	127.05	230 d.			
879	C ₅ H ₅ N ₁	Adenine.....	135.08	365			
880	C ₅ H ₆	Cyclopentadiene.....	66.046		42.5	0.805	903
881	C ₅ H ₆	2-Methyl-1, 3-butenine (Valylene).....	66.046		50		
882	C ₅ H ₆ N ₂	2-Aminopyridine.....	94.062	56	204		
883	C ₅ H ₆ N ₂	3-Aminopyridine.....	94.062	64	252		
884	C ₅ H ₆ N ₂	4-Aminopyridine H ₂ NC ₄ H ₄ N.....	94.062	157			
886	C ₅ H ₆ N ₂	Glutaric nitrile NC(CH ₂) ₃ NC.....	94.062	-29	287.4	0.995 ¹⁴	1007
887	C ₅ H ₆ N ₂ O	2-Hydroxyglutaric nitrile.....	110.06		203 ¹¹	1.181	534
888	C ₅ H ₆ N ₂ O ₂	Thymine.....	126.06	335 d.			
889	C ₅ H ₆ N ₂ O ₂	Dimethylparabanic acid.....	142.06	145	277		
890	C ₅ H ₆ N ₂ O ₂	Pyridine nitrate.....	142.06				1333
891	C ₅ H ₆ O	2-Methylfurfuran.....	82.046		64.3	0.916	
892	C ₅ H ₆ OS	Thiophene-2-alcohol.....	114.11		207		
893	C ₅ H ₆ O ₂	Furfuryl alcohol.....	98.046		170.2	1.136	996
894	C ₅ H ₆ O ₂	Pentinoic acid.....	98.046	103			
895	C ₅ H ₆ O ₂	Ethyl propiolate CH:CCO ₂ C ₂ H ₅	98.046		119.5	0.968 ¹⁴	
896	C ₅ H ₆ O ₂	Propargyl acetate CH:CCH ₂ O ₂ CCH ₃ ...	98.046		125	1.005	252
897	C ₅ H ₆ O ₂	Glutaric anhydride.....	114.05	57	287		
898	C ₅ H ₆ O ₄	Citraconic acid CH ₂ C(CO ₂ H):CHCO ₂ H..	130.05	91		1.617	
899	C ₅ H ₆ O ₄	Glutaconic acid.....	130.05	134			
900	C ₅ H ₆ O ₄	Itaconic acid CH ₂ :C(CO ₂ H)CH ₂ CO ₂ H..	130.05	161 d.		1.632	
901	C ₅ H ₆ O ₄	Mesaconic acid CH ₂ (CO ₂ H)C:CHCO ₂ H..	130.05	202	250		
902	C ₅ H ₆ O ₄	Paraconic acid.....	130.05	58			
903	C ₅ H ₆ O ₄	Trimethylene-1, 1-dicarboxylic acid.....	130.05	175	210 ³⁰		
904	C ₅ H ₆ O ₄	Acetone-1-1'-dicarboxylic acid.....	146.05	135 d.			
905	C ₅ H ₆ O ₄	1-Ketoglutaric acid.....	146.05	113			
906	C ₅ H ₆ N ₂ O ₂	1-Methylbarbituric acid.....	142.06	132			
907	C ₅ H ₇ Cl ₂ O ₂	Chloral acetone.....	205.43	76			
908	C ₅ H ₇ N	1-Methylpyrrrole.....	81.062		115.4	0.911	892
909	C ₅ H ₇ N	2-Methylpyrrrole.....	81.062		148	0.945	
910	C ₅ H ₇ N	3-Methylpyrrrole.....	81.062		143		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
911	C ₅ H ₇ NO ₂	Ethyl cyanoacetate NCCH ₂ CO ₂ C ₂ H ₅ ...	113.06	-22.5	206	1.063	232
912	C ₅ H ₇ NS	Crotonyl isothiocyanate.....	113.13		85 ⁵⁰	0.993 ⁹	
913	C ₅ H ₈	Cyclopentene.....	68.062		43.6	0.776	
914	C ₅ H ₈	2, 3-Pentadiene CH ₂ CH:C:CHCH ₂	68.082		51	0.702	
915	C ₅ H ₈	<i>unsym.</i> -Dimethylallene (CH ₃) ₂ C:C:CH ₂	68.062	-120	40.5	0.678	
916	C ₅ H ₈	Isoprene CH ₂ :C(CH ₃)CH:CH ₂	68.062	-120	34	0.679	943
917	C ₅ H ₈	Methylethylacetylene CH ₃ C:CC ₂ H ₅	68.062		56	0.687	121
918	C ₅ H ₈	1, 3-Pentadiene CH ₂ CH:CHCH:CH ₂	68.062		44	0.696	901
920	C ₅ H ₈	Propylacetylene C ₃ H ₇ C:CH.....	68.062	-95	40	0.722 ⁹	932
921	C ₅ H ₈	Isopropylacetylene (CH ₃) ₂ CHC:CH.....	68.062		29.3	0.685 ⁹	
921.1	C ₅ H ₈ Cl ₂ O ₂	Ethyl 1, 2-dichloropropionate.....	170.98		184	1.246	424
921.2	C ₅ H ₈ N ₂	3, 4-Dimethylpyrazole.....	96.078	58		0.933 ^{10, 11}	1131
922	C ₅ H ₈ N ₂	3, 5-Dimethylpyrazole.....	96.078	107	220		
923	C ₅ H ₈ N ₂ O ₆	Uroxic acid.....	220.09	162 d.			
924	C ₅ H ₈ O	Cyclopentanone.....	84.062		130.6	0.951	353
925	C ₅ H ₈ O	Ethyl propargyl ether CH ₃ CCH ₂ OC ₂ H ₅	84.062		80	0.833	325
926	C ₅ H ₈ O	Tiglic aldehyde CH ₃ CH:C(CH ₃)CHO.....	84.062		116.5	0.870	430
927	C ₅ H ₈ O	Ethylideneacetone CH ₃ CH:CHCOCH ₃	84.062		124	0.856	370
928	C ₅ H ₈ O ₂	Levulinic aldehyde.....	100.062		188	1.018	295
929	C ₅ H ₈ O ₂	Acetylacetone CH ₃ COCH ₂ COCH ₃	100.062	-23.2	137	0.976	439
930	C ₅ H ₈ O ₂	Allylacetic acid CH ₂ :CH(CH ₃)CO ₂ H.....	100.062	< -18	189	0.984	805
931	C ₅ H ₈ O ₂	Angellic acid.....	100.062	45	185	0.983 ^{14, 7}	1069
932	C ₅ H ₈ O ₂	2, 2-Dimethylacrylic acid.....	100.062	70	195		
933	C ₅ H ₈ O ₂	1-Ethylacrylic acid CH ₂ :C(C ₂ H ₅)CO ₂ H.....	100.062	45	180		
934	C ₅ H ₈ O ₂	1, 2-Pentenic acid C ₅ H ₈ CH:CHCO ₂ H.....	100.062	10	108 ¹⁷	0.990	904
935	C ₅ H ₈ O ₂	2, 3-Pentenic acid.....	100.062		95 ¹⁶	0.987	949
936	C ₅ H ₈ O ₂	Tiglic acid CH ₃ CH:C(CH ₃)CO ₂ H.....	100.062	64	198.5	0.872	1121
937	C ₅ H ₈ O ₂	Allyl acetate CH ₂ CO ₂ C ₂ H ₅	100.062		105	0.928	146
938	C ₅ H ₈ O ₂	Ethyl acrylate C ₂ H ₅ COC ₂ H ₃	100.062		99.8	0.924	
939	C ₅ H ₈ O ₂	Methyl α-crotonate.....	100.062		120.7	0.981 ⁴	
941	C ₅ H ₈ O ₂	Levulinic acid CH ₃ COCH ₂ CH ₂ CO ₂ H.....	116.06	33.1	246	1.143 ¹⁷	383
942	C ₅ H ₈ O ₂	Ethyl pyruvate CH ₃ COCO ₂ C ₂ H ₅	116.06		144	1.060 ¹⁸	882
943	C ₅ H ₈ O ₂	Methyl acetoacetate.....	116.06		170	1.077	241
944	C ₅ H ₈ O ₂	Dimethylmalonic acid (CH ₃) ₂ C(CO ₂ H) ₂	132.06	193			
945	C ₅ H ₈ O ₂	Ethylmalonic acid C ₂ H ₅ CH(CO ₂ H) ₂	132.06	111.5	160 d.		
946	C ₅ H ₈ O ₂	Glutaric acid CH ₂ (CH ₂ CO ₂ H) ₃	132.06	97.5	304	1.192 ¹⁰⁸	1151
947	C ₅ H ₈ O ₂	Pyrotartaric acid.....	132.06	111		1.411	1333
947.1	C ₅ H ₈ O ₂	Methyltetronic lactone.....	132.06	123			1213
948	C ₅ H ₈ O ₂	Dimethyl malonate H ₃ C(CO ₂ CH ₃) ₂	132.06	-62	181.5	1.154	206
949	C ₅ H ₈ O ₂	Ethyl hydrogen malonate.....	132.06		147 ²¹	1.176	301
950	C ₅ H ₈ O ₂	Methyl ethyl oxalate.....	132.06		173.7	1.156 ⁹	
951	C ₅ H ₈ O ₂	Methylene diacetate CH ₂ (CO ₂ CH ₃) ₂	132.06		170		
952	C ₅ H ₈ O ₂	α-Citramalic acid.....	148.06	95			
953	C ₅ H ₈ O ₂	dl-Citramalic acid.....	148.06	117			
954	C ₅ H ₈ O ₂	β-Methylmalic acid.....	148.06	123			
955	C ₅ H ₈ O ₂	Arabonic lactone.....	148.06	98			
956	C ₅ H ₈ O ₂	Dimethyl tartronate.....	148.06	53.3			
957	C ₅ H ₈ O ₄ (H ₂ O)	d-Methyl hydrogen tartrate.....	164.06	76			
958	C ₅ H ₈ O ₇	Aposorbinic acid.....	180.06	110			
959	C ₅ H ₈ BrO ₂	1-Bromovaleric acid C ₂ H ₄ CHBrCO ₂ H.....	180.99		105 ¹⁰		
960	C ₅ H ₈ BrO ₂	2-Bromovaleric acid.....	180.99	60			
961	C ₅ H ₈ BrO ₂	3-Bromovaleric acid.....	180.99	40			
962	C ₅ H ₈ BrO ₂	2-Bromoisovaleric acid.....	180.99	73.5			
963	C ₅ H ₈ BrO ₂	Ethyl 1-bromopropionate.....	180.99		160	1.393	419
964	C ₅ H ₈ Br ₃	1, 2, 3-Tribromopentane.....	308.82		128 ²¹	2.095 ¹⁴	743
965	C ₅ H ₈ Cl	Isoprene hydrochloride.....	104.53		109	0.933	
966	C ₅ H ₈ ClO	n-Valeryl chloride C ₄ H ₉ COCl.....	120.53		128	1.016 ¹⁴	223
967	C ₅ H ₈ ClO	Isovaleryl chloride (CH ₃) ₂ CHCH ₂ COCl.....	120.53		113		
968	C ₅ H ₈ ClO ₂	Ethyl 1-chloropropionate.....	136.53		146	1.087	235
969	C ₅ H ₈ ClO ₂	Ethyl 2-chloropropionate.....	136.53		162.5	1.114	236
969.1	C ₅ H ₈ ClO ₂	n-Butyl chloroformate ClCO ₂ C ₄ H ₉	136.53		138.9	1.078	807
970	C ₅ H ₈ ClO ₂	Isobutyl chloroformate.....	136.53		130	1.040 ²²	
971	C ₅ H ₈ IO ₂	Ethyl 2-iodopropionate.....	228.00		202	1.679 ¹⁴	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
972	C ₅ H ₇ N	<i>n</i> -Valeryl nitrile C ₅ H ₇ CN.....	83.077		141	0.801	82
973	C ₅ H ₇ N	Isovaleryl nitrile (CH ₃) ₂ CHCH ₂ CN....	83.077		129.3	0.802	
974	C ₅ H ₉ NO	Piperidone.....	99.077	40	256		
975	C ₅ H ₉ NO ₂	Acetylurethane CH ₃ CONHCO ₂ C ₂ H ₅	131.08	78	215		
975.1	C ₅ H ₉ NO ₂	α -Acetylaminopropionic acid.....	131.08	133			1215
976	C ₅ H ₉ NO ₄	<i>dl</i> -Glutaminic acid.....	147.08	198		1.460	1261
977	C ₅ H ₉ NO ₄	<i>d</i> -Glutaminic acid.....	147.08	208 d.		1.538	1266
978	C ₅ H ₇ NS	Isobutyl isothiocyanate.....	115.14		162	0.943	
979	C ₅ H ₁₀	Cyclopentane CH ₂ <(CH ₂ CH ₂) ₂ >.....	70.077	-93.3	49.5	0.754	843
980	C ₅ H ₁₀	1, 1-Dimethyltrimethylene.....	70.077		21	0.660	
981	C ₅ H ₁₀	Methylcyclobutane.....	70.077		42		
982	C ₅ H ₁₀	β -Amylene CH ₂ CH:CHC ₂ H ₅	70.077	-139	36.4	0.651	921
983	C ₅ H ₁₀	α -Amylene C ₂ H ₅ C(CH ₃):CH ₂	70.077		32	0.667°	880
984	C ₅ H ₁₀	<i>n</i> -Propylethylene C ₂ H ₇ CH:CH ₂	70.077		40		31
985	C ₅ H ₁₀	2-Methyl-3-butene CH ₃ :CHCH(CH ₃) ₂ ..	70.077	-135	20.1	0.632 ¹⁵	
986	C ₅ H ₁₀	2-Methyl-2-butene CH ₃ CH:C(CH ₃) ₂ ...	70.077	-124	38.4	0.668 ¹⁵	
987	C ₅ H ₁₀ Br ₂	1, 5-Dibromopentane CH ₂ (CH ₂ CH ₂ Br) ₂	229.91	-35	224	1.706 ¹⁸	
988	C ₅ H ₁₀ Br ₂	2, 3-Dibromopentane C ₂ H ₅ (CHBr) ₂ CH ₃	229.91		175	1.7087°	866
988.1	C ₅ H ₁₀ ClNO ₄	<i>d</i> (l)-Glutaminic acid hydrochloride.....	183.54	193			1240
989	C ₅ H ₁₀ Cl ₂	3, 3-Dichloro-2-methylbutane.....	140.99		145	1.065	
990	C ₅ H ₁₀ Cl ₂	1, 4-Dichloropentane.....	140.99		61 ¹⁷		
991	C ₅ H ₁₀ Cl ₂	1, 5-Dichloropentane CH ₂ (CH ₂ CH ₂ Cl) ₂	140.99		178		
992	C ₅ H ₁₀ Cl ₂	2, 3-Dichloropentane C ₂ H ₅ (CHCl) ₂ CH ₃	140.99		139		
993	C ₅ H ₁₀ N ₂	Diethylcyanamide NCN(C ₂ H ₅) ₂	98.093		187 d.	0.854	1072
994	C ₅ H ₁₀ N ₂ O ₂	1-Nitropiperidine.....	130.09	-5.5	245	1.158	1033
994.1	C ₅ H ₁₀ N ₂ O ₂	Dimethylmalonamide.....	130.09	198			1208
995	C ₅ H ₁₀ N ₂ O ₂	<i>dl</i> -Glutamine.....	146.09	256			
996	C ₅ H ₁₀ N ₂ O ₄	Amylene nitrosate.....	162.09	99			1207
997	C ₅ H ₁₀ O	Cyclopentanol.....	86.077		141	0.946	
998	C ₅ H ₁₀ O	Methylallyl carbinol.....	86.077		116.4	0.834	
999	C ₅ H ₁₀ O	Vinylethyl carbinol.....	86.077		114.7	0.837	277
1000	C ₅ H ₁₀ O	2-Pentene-4-ol.....	86.077		64 ¹²	0.838	933
1001	C ₅ H ₁₀ O	Ethyl allyl ether C ₂ H ₅ OCH ₂ CH:CH ₂ ...	86.077		67.6	0.765	69
1002	C ₅ H ₁₀ O	Isovaleraldehyde (CH ₃) ₂ CHCH ₂ CHO...	86.077	-51	92.5	0.803 ¹⁷	79
1003	C ₅ H ₁₀ O	Trimethylacetaldehyde (CH ₃) ₃ CCHO...	86.077	3	75	0.793	
1004	C ₅ H ₁₀ O	<i>n</i> -Valeric aldehyde C ₅ H ₉ CHO.....	86.077		103.4	0.819 ¹¹	70
1005	C ₅ H ₁₀ O	Diethyl ketone (C ₂ H ₅) ₂ CO.....	86.077	-42.0	101.7	0.814	86
1006	C ₅ H ₁₀ O	Methyl propyl ketone CH ₃ COC ₂ H ₅	86.077	-77.8	101.7	0.812 ¹⁵	75
1007	C ₅ H ₁₀ O	Methyl isopropyl ketone.....	86.077	-92.0	93	0.815 ¹⁵	62
1008	C ₅ H ₁₀ O	Pentamethylene oxide.....	86.077		87	0.880°	
1009	C ₅ H ₁₀ O ₂	3-Acetylpropyl alcohol.....	102.08		209	1.016°	
1010	C ₅ H ₁₀ O ₂	<i>dl</i> -Methylethylacetic acid.....	102.08	< -80	174	0.941	153
1011	C ₅ H ₁₀ O ₂	Trimethylacetic acid (CH ₃) ₃ CCO ₂ H....	102.08	35.5	163.8	0.905 ¹⁰	1050
1012	C ₅ H ₁₀ O ₂	<i>n</i> -Valeric acid C ₅ H ₁₁ CO ₂ H.....	102.08	-59; -34.5	187.0	0.942	175
1013	C ₅ H ₁₀ O ₂	Isovaleric acid (CH ₃) ₂ CHCH ₂ CO ₂ H....	102.08	-37.6	176.7	0.937 ¹⁵	145
1014	C ₅ H ₁₀ O ₂	<i>n</i> -Butyl formate HCO ₂ C ₄ H ₉	102.08	-90.0	106.8	0.911°	74
1015	C ₅ H ₁₀ O ₂	<i>d</i> - <i>sec</i> .-Butyl formate.....	102.08		97	0.882	48
1016	C ₅ H ₁₀ O ₂	Isobutyl formate (CH ₃) ₂ CHCH ₂ CO ₂ H....	102.08	-95.3	98.2	0.875	58
1017	C ₅ H ₁₀ O ₂	Ethyl propionate C ₂ H ₅ CO ₂ C ₂ H ₅	102.08	-72.6	99.1	0.891	51
1018	C ₅ H ₁₀ O ₂	Methyl <i>n</i> -butyrate C ₄ H ₉ CO ₂ CH ₃	102.08	< -95	102.3	0.898	68
1019	C ₅ H ₁₀ O ₂	Methyl isobutyrate (CH ₃) ₂ CHCO ₂ CH ₃ ...	102.08	-84.7	92.6	0.891	49
1020	C ₅ H ₁₀ O ₂	<i>n</i> -Propyl acetate CH ₃ CO ₂ C ₃ H ₇	102.08	-92.5	101.6	0.887	52
1021	C ₅ H ₁₀ O ₂	Isopropyl acetate CH ₃ COCH ₂ (CH ₃) ₂ ...	102.08	-73.4	89	0.877 ¹⁵	
1022	C ₅ H ₁₀ O ₂ S	Ethyl thiocarbonate CS(OC ₂ H ₅) ₂	134.14		162	1.028	939
1023	C ₅ H ₁₀ O ₃	1-Hydroxyvaleric acid.....	118.08	31			
1024	C ₅ H ₁₀ O ₃	1-Hydroxyisovaleric acid.....	118.08	86			
1025	C ₅ H ₁₀ O ₃	2-Hydroxyvaleric acid.....	118.08	< -32			
1026	C ₅ H ₁₀ O ₃	Diethyl carbonate (C ₂ H ₅ O) ₂ CO.....	118.08	-43.0	125.8	0.979	57
1027	C ₅ H ₁₀ O ₃	Ethyl hydracrylate.....	118.08		84 ¹³	1.064 ²⁵	313
1028	C ₅ H ₁₀ O ₃	Ethyl lactate CH ₃ CH(OH)CO ₂ C ₂ H ₅	118.08		154	1.031	
1028.1	C ₅ H ₁₀ O ₃	Methyl <i>l</i> -1-methoxypropionate.....	118.08		131	0.9986 ^{16.4}	
1029	C ₅ H ₁₀ O ₃	Propyl glycolate HOCH ₂ CO ₂ C ₃ H ₇	118.08		170.5	1.062 ¹⁵	
1030	C ₅ H ₁₀ O ₄	Ethyl glycerate.....	134.08		121 ¹⁴	1.191 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1031	C ₅ H ₁₀ O ₄	Glycerol acetate (Monoacetin).....	134.08		158 ¹⁰⁰	1.20	
1032	C ₅ H ₁₀ O ₅	<i>d</i> (l)- α -Arabinose.....	150.08	159.5		1.585	1243
1033	C ₅ H ₁₀ O ₅	<i>d</i> (l)- β -Arabinose.....	150.08			1.605	1248
1034	C ₅ H ₁₀ O ₅	<i>dl</i> -Arabinose.....	150.08	164.5			
1035	C ₅ H ₁₀ O ₅	<i>d</i> -Lyxose.....	150.08	105		1.545	1228
1036	C ₅ H ₁₀ O ₅	<i>d</i> -Ribose.....	150.08	87			
1037	C ₅ H ₁₀ O ₅	<i>l</i> -Xylose.....	150.08	153		1.525	1231
1038	C ₅ H ₁₀ O ₅	<i>dl</i> -Xylose.....	150.08	131			
1039	C ₅ H ₁₀ O ₆	Arabonic acid HO ₂ C(CHOH) ₂ CH ₂ OH..	166.08	89			
1040	C ₅ H ₁₁ Br	<i>n</i> -Amyl bromide CH ₃ (CH ₂) ₄ Br.....	151.00		127.9	1.223	401
1041	C ₅ H ₁₁ Br	Isoamyl bromide (CH ₃) ₂ CHCH ₂ CH ₂ Br..	151.00		121	1.215	378
1042	C ₅ H ₁₁ Br	<i>tert</i> -Amyl bromide (CH ₃) ₂ (C ₂ H ₅)CBr...	151.00		109.2	1.190	389
1043	C ₅ H ₁₁ Cl	<i>n</i> -Amyl chloride CH ₃ (CH ₂) ₄ Cl.....	106.54		105.7	0.883	191
1044	C ₅ H ₁₁ Cl	Isoamyl chloride (CH ₃) ₂ CHCH ₂ CH ₂ Cl..	106.54		99.1	0.893	181
1045	C ₅ H ₁₁ Cl	<i>tert</i> -Amyl chloride (CH ₃) ₂ (C ₂ H ₅)CCl...	106.54	-72.9	85.7	0.870 ¹⁵	155
1046	C ₅ H ₁₁ Cl	<i>sec</i> -Amyl chloride C ₂ H ₇ (CH ₂)CHCl....	106.54		105	0.870	157
1047	C ₅ H ₁₁ Cl	3-Chloropentane (C ₂ H ₅) ₂ CHCl.....	106.54		105	0.895	
1048	C ₅ H ₁₁ ClO	<i>tert</i> -Amyl hypochlorite.....	122.54		76.3	0.855	
1049	C ₅ H ₁₁ F	<i>n</i> -Amyl fluoride CH ₃ (CH ₂) ₄ F.....	90.085	> -80	62.8	0.788	11
1050	C ₅ H ₁₁ F	Isoamyl fluoride (CH ₃) ₂ CHCH ₂ CH ₂ F....	90.085	< -11	53.5		
1051	C ₅ H ₁₁ I	<i>n</i> -Amyl iodide CH ₃ (CH ₂) ₄ I.....	198.02		156	1.517	572
1052	C ₅ H ₁₁ I	Isoamyl iodide (CH ₃) ₂ CHCH ₂ CH ₂ I....	198.02		148	1.510	
1053	C ₅ H ₁₁ I	<i>tert</i> -Amyl iodide (CH ₃) ₂ (C ₂ H ₅)CHI...	198.02		125	1.497 ¹⁹	
1054	C ₅ H ₁₁ N	Piperidine.....	85.093	-9	105.8	0.860	444
1055	C ₅ H ₁₁ NO	Diethylketoxime (C ₂ H ₅) ₂ C:NOH.....	101.09		168.3	0.914	407
1056	C ₅ H ₁₁ NO	Methylpropylketoxime.....	101.09		168	0.909	403
1057	C ₅ H ₁₁ NO	Valeramide C ₄ H ₉ CONH ₂	101.09	106		1.023	
1058	C ₅ H ₁₁ NO	Isovaleramide (CH ₃) ₂ CHCH ₂ CONH ₂ ...	101.09	137	232	0.965	
1059	C ₅ H ₁₁ NO ₂	1-Aminovaleric acid.....	117.09	291.5			
1060	C ₅ H ₁₁ NO ₂	3-Aminovaleric acid.....	117.09	193			
1061	C ₅ H ₁₁ NO ₂	4-Aminovaleric acid.....	117.09	157			
1062	C ₅ H ₁₁ NO ₂	2-Aminoisovaleric acid.....	117.09	217			
1063	C ₅ H ₁₁ NO ₂	<i>n</i> -Amyl nitrite CH ₃ (CH ₂) ₄ ONO.....	117.09		104 ⁷⁴	0.853	56
1064	C ₅ H ₁₁ NO ₂	Isoamyl nitrite (CH ₃) ₂ CH(CH ₂) ₂ ONO...	117.09		99	0.872	67
1065	C ₅ H ₁₁ NO ₂	<i>tert</i> -Amyl nitrite (CH ₃) ₂ (C ₂ H ₅)CONO...	117.09		93	0.903 ^o	
1066	C ₅ H ₁₁ NO ₂	<i>n</i> -Butyl carbamate C ₄ H ₉ CO ₂ NH ₂	117.09	54			
1067	C ₅ H ₁₁ NO ₂	Isobutyl carbamate H ₂ NCO ₂ C ₄ H ₉	117.09	67	206		
1067.1	C ₅ H ₁₁ NO ₂	Ethylurethane C ₂ H ₅ NHCO ₂ C ₂ H ₅	117.09		176	0.981	262
1068	C ₅ H ₁₁ NO ₂	Betaine.....	117.09	273 d.			
1069	C ₅ H ₁₁ NO ₂	<i>dl</i> -Valine (CH ₃) ₂ CHCH(NH ₂)CO ₂ H....	117.09	298 d.			
1069.1	C ₅ H ₁₁ NO ₂	<i>d</i> -Valine.....	117.09	315			1327
1070	C ₅ H ₁₁ NO ₃	Isoamyl nitrate.....	133.09		148	0.996 ^{21.7}	200
1070.1	C ₅ H ₁₁ NO ₃	Bios.....	133.09	223			1163
1070.2	C ₅ H ₁₁ NO ₄	Methyltetronic amide.....	149.09	135 d.			1218
1071	C ₅ H ₁₁ NO ₅	<i>l</i> -Arabinose oxime.....	165.09	139			
1072	C ₅ H ₁₂	2-Methylbutane (Isopentane).....	72.092	-159.7	28.0	0.621 ^{19.1}	9
1073	C ₅ H ₁₂	<i>n</i> -Pentane CH ₃ (CH ₂) ₃ CH ₃	72.092	-131.5	36.2	0.631	10
1074	C ₅ H ₁₂	2, 2-Dimethylpropane (CH ₃) ₄ C.....	72.092	-20	9.5		
1075	C ₅ H ₁₂ ClN	Piperidine hydrochloride.....	121.56	237			
1076	C ₅ H ₁₂ ClNO ₂	Betaine hydrochloride.....	153.56	235			
1077	C ₅ H ₁₂ N ₂ O	1, 2-Diethylurea CO(NHC ₂ H ₅) ₂	116.11	106	263	1.042	
1078	C ₅ H ₁₂ O	<i>n</i> -Amyl alcohol CH ₃ (CH ₂) ₄ CH ₂ OH....	88.092	-78.5	137.9	0.817 ²⁰	823
1079	C ₅ H ₁₂ O	Isoamyl alcohol* (CH ₃) ₂ CHCH ₂ CH ₂ OH..	88.092	-117.2	130.5	0.812	166
1080	C ₅ H ₁₂ O	Diethyl carbinol (C ₂ H ₅) ₂ CHOH.....	88.092		115.6	0.815 ²⁴	179
1081	C ₅ H ₁₂ O	<i>tert</i> -Amyl alcohol (CH ₃) ₂ (C ₂ H ₅)COH...	88.092	-11.9	101.8	0.809	158
1082	C ₅ H ₁₂ O	<i>tert</i> -Butyl carbinol.....	88.092	53	114		
1083	C ₅ H ₁₂ O	<i>d</i> -Amyl alcohol CH ₃ (C ₂ H ₅)CHCH ₂ OH..	88.092		128	0.816	
1084	C ₅ H ₁₂ O	<i>sec</i> -Amyl alcohol CH ₃ (C ₂ H ₅)CH ₂ OH....	88.092		119.5	0.809	165
1084.1	C ₅ H ₁₂ O	<i>d-sec</i> -Amyl alcohol.....	88.092		118	0.8103	154
1085	C ₅ H ₁₂ O	Methyl isopropyl carbinol.....	88.092		114	0.819	
1085.1	C ₅ H ₁₂ O	<i>d</i> -Methyl isopropyl carbinol.....	88.092			0.818	106
1086	C ₅ H ₁₂ O	Ethyl propyl ether C ₂ H ₅ OC ₂ H ₅	88.092	< -79	61.4	0.732	24
1087	C ₅ H ₁₂ O	Ethyl isopropyl ether C ₂ H ₅ OCH(CH ₃) ₂ ..	88.092		54	0.745 ^o	

* Commercially known as "Amyl alcohol."

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1088	C ₄ H ₁₀ O	Methyl <i>n</i> -butyl ether CH ₃ OC ₄ H ₉	88.092		70.3	0.764°	
1089	C ₆ H ₁₂ O ₂	Pentane-1, 2-diol C ₅ H ₇ CHOHCH ₂ OH..	104.09		211.8	0.980 ₂₀ ²⁰	376
1090	C ₆ H ₁₂ O ₂	Pentane-1, 5-diol CH ₃ (CH ₂ CH ₂ OH) ₂ ...	104.09		239.4	0.994 ₂₀ ²⁰	432
1091	C ₆ H ₁₂ O ₂	Methylene diethyl ether CH ₃ (OC ₂ H ₅) ₂ ..	104.09		89	0.851°	
1092	C ₆ H ₁₂ O ₂	Glycerol 1-ethyl ether.....	120.09		230	1.091	
1093	C ₆ H ₁₂ O ₄	Pentaerythritol.....	136.09	253			1178
1094	C ₆ H ₁₂ O ₄	Adonitol.....	152.09	102			1333
1095	C ₆ H ₁₂ O ₄	<i>d</i> -Arabitol.....	152.09	103			
1096	C ₆ H ₁₂ S	<i>n</i> -Amyl mercaptan C ₅ H ₁₁ SH.....	104.16		126	0.857 ₂₀ ²⁰	396
1097	C ₆ H ₁₂ S	<i>act.</i> -Amyl mercaptan.....	104.16		118	0.848 ₁₅ ¹⁵	
1098	C ₆ H ₁₂ S	Isoamyl mercaptan.....	104.16		129.5	0.835	379
1099	C ₆ H ₁₂ N	<i>n</i> -Amylamine C ₅ H ₁₁ NH ₂	87.108	-55.0	104	0.766 ₁₉ ¹⁹	
1100	C ₆ H ₁₂ N	Isoamylamine (CH ₃) ₂ CHCH ₂ CH ₂ NH ₂ ..	87.108		95	0.751	176
1101	C ₆ H ₁₂ N	<i>sec.</i> -Amylamine CH ₃ (C ₂ H ₅)CH ₂ NH ₂ ...	87.108		91	0.749	
1102	C ₆ H ₁₂ N	<i>tert.</i> -Amylamine (CH ₃) ₂ (C ₂ H ₅)CNH ₂ ...	87.108	-105.0	78		
1103	C ₆ H ₁₂ NO ₂	Ammonium valerate.....	119.11				1333
1105	C ₆ H ₁₂ N ₂	Pentamethylenediamine.....	102.12	9	178	0.885 ₁₅ ¹⁵	482
1106	C ₆ Br ₂ O ₂	Bromanil OC:(CBrCBR) ₂ :CO.....	423.66	300			
1107	C ₆ Br ₆	Hexabromobenzene.....	551.50	306			
1108	C ₆ Br ₆ O	"Hexabromophenol".....	367.50	128			
1109	C ₆ Cl ₂ O ₂	Chloranil OC:(CClCCl) ₂ :CO.....	245.83	290			
1110	C ₆ Cl ₆	Hexachlorobenzene.....	284.75	226	326	1.569 ₂₄ ²⁴	
1111	C ₆ Cl ₆ O	"Hexachlorophenol".....	300.75	46			
1111.1	C ₆ Cl ₆ O	β -Octachlorocyclohexenone.....	371.67	90		2.016	1292
1111.2	C ₆ Cl ₆ O	γ -Octachlorocyclohexenone.....	371.67	89		2.058	1305
1112	C ₆ I ₆	Hexaiodobenzene.....	833.59	350 d.			
1113	C ₆ HBr ₅	Pentabromobenzene.....	472.59	293			
1114	C ₆ HBr ₅ O	Pentabromophenol C(Br) ₅ OH.....	488.59	225			
1115	C ₆ HCl ₃ O ₂	Trichloroquinone.....	211.38	168			
1116	C ₆ HCl ₃ NO ₂	2, 3, 4, 5-Tetrachloronitrobenzene.....	260.85	64.5			
1117	C ₆ HCl ₃ NO ₂	2, 3, 4, 6-Tetrachloronitrobenzene.....	260.85	22			
1118	C ₆ HCl ₃ NO ₂	2, 3, 5, 6-Tetrachloronitrobenzene.....	260.85	99	304 d.		
1119	C ₆ HCl ₅	Pentachlorobenzene.....	250.30	86	277	1.842 ₁₀ ¹⁰	
1120	C ₆ HCl ₅ O	Pentachlorophenol HOC ₆ Cl ₅	266.30	188	310.2	1.978	
1121	C ₆ HN ₃ O ₁₁	Pentanitrophenol C ₆ (NO ₂) ₅ OH.....	319.05	190 d.			
1122	C ₆ H ₂ Br ₂ N ₂ O ₄	Picryl bromide 2, 4, 6(NO ₂) ₃ C ₆ H ₂ Br....	291.96	123			
1122.1	C ₆ H ₂ Br ₂ N ₂ O ₄	1, 2-Dinitro-4, 5-dibromobenzene.....	325.86	115		2.313	
1122.2	C ₆ H ₂ Br ₂ N ₂ O ₄	1, 3-Dinitro-4, 6-dibromobenzene.....	325.86	117		2.295	
1123	C ₆ H ₂ Br ₄	1, 2, 3, 5-Tetrabromobenzene.....	393.68	98.5	329		
1124	C ₆ H ₂ Br ₄	1, 2, 4, 5-Tetrabromobenzene.....	393.68	178		3.027	
1125	C ₆ H ₂ Br ₄ O	2, 3, 4, 6-Tetrabromophenol.....	409.68	120			
1126	C ₆ H ₂ Br ₄ N	Pentabromoaniline C ₆ (Br) ₄ NH ₂	487.60	222			
1127	C ₆ H ₂ ClN ₃ O ₆	Picryl chloride (NO ₂) ₃ C ₆ H ₂ Cl.....	247.50	83		1.797	
1128	C ₆ H ₂ ClN ₃ O ₆	5-Chloro-1, 2, 4-trinitrobenzene.....	247.50	116			
1129	C ₆ H ₂ Cl ₂ O ₂	2, 5-Dichloroquinone.....	176.93	161			
1130	C ₆ H ₂ Cl ₂ O ₂	2, 6-Dichloroquinone.....	176.93	121			
1131	C ₆ H ₂ Cl ₂ NO ₂	2, 3, 4-Trichloronitrobenzene.....	226.40	56			
1132	C ₆ H ₂ Cl ₂ NO ₂	2, 3, 6-Trichloronitrobenzene.....	226.40	89			
1133	C ₆ H ₂ Cl ₂ NO ₂	2, 4, 5-Trichloronitrobenzene.....	226.40	57	288	1.790	
1134	C ₆ H ₂ Cl ₂ NO ₂	2, 4, 6-Trichloronitrobenzene.....	226.40	68			
1135	C ₆ H ₂ Cl ₄	1, 2, 3, 4-Tetrachlorobenzene.....	215.85	47.5	254		
1136	C ₆ H ₂ Cl ₄	1, 2, 3, 5-Tetrachlorobenzene.....	215.85	51	246		
1137	C ₆ H ₂ Cl ₄	1, 2, 4, 5-Tetrachlorobenzene.....	215.85	138	246	1.734 ₁₀ ¹⁰	
1138	C ₆ H ₂ Cl ₄ O	2, 3, 4, 6-Tetrachlorophenol.....	231.85	69	164 ₂₃ ²³		
1139	C ₆ H ₂ Cl ₄ O ₂	Tetrachlorohydroquinone.....	247.85	232			
1140	C ₆ H ₂ Cl ₄ N	Pentachloroaniline C ₆ (Cl) ₄ NH ₂	265.31	232			
1141	C ₆ H ₂ I ₂ N ₂ O ₆	Picryl iodide (NO ₂) ₃ C ₆ H ₂ I.....	338.97	165		2.285 _{22.4} ^{22.4}	
1142	C ₆ H ₂ I ₂ N ₂ O ₆	2, 4-Diiodo-1, 3-dinitrobenzene.....	419.90	162			1315
1143	C ₆ H ₂ I ₂ N ₂ O ₆	4, 6-Diiodo-1, 3-dinitrobenzene.....	419.90	168.4		2.744	
1144	C ₆ H ₂ I ₄	1, 2, 3, 4-Tetraiodobenzene.....	581.74	136			
1145	C ₆ H ₂ I ₄	1, 2, 3, 5-Tetraiodobenzene.....	581.74	148			
1146	C ₆ H ₂ I ₄	1, 2, 4, 5-Tetraiodobenzene.....	581.74	254			
1147	C ₆ H ₂ N ₄ O ₈	2, 3, 4, 6-Tetranitrophenol.....	274.05	140	d.		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1148	C ₆ H ₂ O ₄	Diacetylenedicarboxylic acid.....	138.02	178 exp.			
1149	C ₆ H ₂ BrN ₂ O ₄	3-Bromo-1, 2-dinitrobenzene.....	246.96	101.5	320		1302
1150	C ₆ H ₂ BrN ₂ O ₄	4-Bromo-1, 2-dinitrobenzene.....	246.96	59.4			
1151	C ₆ H ₂ BrN ₂ O ₄	4-Bromo-1, 3-dinitrobenzene.....	246.96	75.3			
1152	C ₆ H ₂ Br ₂ NO ₂	2, 4-Dibromonitrobenzene.....	280.86	62		2.356	
1153	C ₆ H ₂ Br ₂ NO ₂	2, 5-Dibromonitrobenzene.....	280.86	85		2.368	
1154	C ₆ H ₂ Br ₂ NO ₂	3, 4-Dibromonitrobenzene.....	280.86	58	296	2.354	
1155	C ₆ H ₂ Br ₂ NO ₂	3, 5-Dibromonitrobenzene.....	280.86	106			
1155.1	C ₆ H ₂ Br ₂ NO ₂	4, 6-Dibromo-2-nitrophenol.....	296.86	117.5		2.434	
1156	C ₆ H ₂ Br ₃	1, 2, 3-Tribromobenzene.....	314.77	87.4		2.658	
1157	C ₆ H ₂ Br ₃	1, 2, 4-Tribromobenzene.....	314.77	44	276		
1158	C ₆ H ₂ Br ₃	1, 3, 5-Tribromobenzene.....	314.77	119.6	278		
1159	C ₆ H ₂ Br ₃ O	2, 3, 5-Tribromophenol Br ₃ C ₆ H ₂ OH....	330.77	92.5			
1160	C ₆ H ₂ Br ₃ O	2, 4, 6-Tribromophenol Br ₃ C ₆ H ₂ OH....	330.77	96		2.55	
1161	C ₆ H ₂ Br ₃ O ₂	2, 4, 6-Tribromoresorcinol.....	346.77	111			
1162	C ₆ H ₂ ClN ₂ O ₄	3-Chloro-1, 2-dinitrobenzene.....	202.50	86.8			
1163	C ₆ H ₂ ClN ₂ O ₄	4-Chloro-1, 2-dinitrobenzene.....	202.50	α 36.3 β 37.1 γ 38.8 δ 28	315 d.		
1164	C ₆ H ₂ ClN ₂ O ₄	2-Chloro-1, 3-dinitrobenzene.....	202.50	87			
1165	C ₆ H ₂ ClN ₂ O ₄	α-4-Chloro-1, 3-dinitrobenzene.....	202.50	53.4	315	1.697	
1166	C ₆ H ₂ ClN ₂ O ₄	β-4-Chloro-1, 3-dinitrobenzene.....	202.50	43	315	1.680	
1167	C ₆ H ₂ ClN ₂ O ₄	5-Chloro-1, 3-dinitrobenzene.....	202.50	59			
1168	C ₆ H ₂ ClN ₂ O ₄	2-Chloro-1, 4-dinitrobenzene.....	202.50	60			
1169	C ₆ H ₂ Cl ₂ NO ₂	2, 3-Dichloronitrobenzene.....	191.95	62	258	1.721 ¹⁴	
1170	C ₆ H ₂ Cl ₂ NO ₂	2, 4-Dichloronitrobenzene.....	191.95	33		1.439 ⁸⁰	
1171	C ₆ H ₂ Cl ₂ NO ₂	2, 5-Dichloronitrobenzene.....	191.95	54.5	266	1.669 ²²	
1172	C ₆ H ₂ Cl ₂ NO ₂	2, 6-Dichloronitrobenzene.....	191.95	72.5	130 ^a	1.603 ¹⁷	
1173	C ₆ H ₂ Cl ₂ NO ₂	3, 4-Dichloronitrobenzene.....	191.95	43	256	1.451 ⁸⁰	
1174	C ₆ H ₂ Cl ₂ NO ₂	3, 5-Dichloronitrobenzene.....	191.95	65.4		1.692 ¹⁴	
1174.1	C ₆ H ₂ Cl ₂ NO ₂	4, 6-Dichloro-2-nitrophenol.....	207.95	122		1.822	
1175	C ₆ H ₂ Cl ₃	1, 2, 3-Trichlorobenzene.....	181.40	52	219		
1176	C ₆ H ₂ Cl ₃	1, 2, 4-Trichlorobenzene.....	181.40	17	213	1.574 ¹⁰	754
1177	C ₆ H ₂ Cl ₃	1, 3, 5-Trichlorobenzene.....	181.40	63	208.5		
1178	C ₆ H ₂ Cl ₃ O	2, 3, 5-Trichlorophenol.....	197.40	53.4	253		
1179	C ₆ H ₂ Cl ₃ O	2, 4, 6-Trichlorophenol.....	197.40	68	244.5		
1180	C ₆ H ₂ Cl ₃ O ₂	2, 3, 5-Trichlorohydroquinone.....	213.40	134			
1181	C ₆ H ₂ Cl ₃ O ₂	2, 4, 6-Trichlororesorcinol.....	213.40	83			
1182	C ₆ H ₂ Cl ₃ O ₂ S ₂	Benzene-1, 3, 5-trisulfonyl chloride.....	373.59	184			
1183	C ₆ H ₂ Cl ₄ N	2, 3, 4, 5-Tetrachloroaniline.....	230.86	118			
1184	C ₆ H ₂ Cl ₄ N	2, 3, 4, 6-Tetrachloroaniline.....	230.86	88			
1185	C ₆ H ₂ Cl ₄ N	2, 3, 5, 6-Tetrachloroaniline.....	230.86	90			
1186	C ₆ H ₂ I ₃	1, 2, 3-Triiodobenzene.....	455.82	116			
1187	C ₆ H ₂ I ₃	1, 2, 4-Triiodobenzene.....	455.82	84			
1188	C ₆ H ₂ I ₃	1, 3, 5-Triiodobenzene.....	455.82	181			
1189	C ₆ H ₂ I ₃ O	2, 4, 6-Triiodophenol I ₃ C ₆ H ₂ (OH).....	471.82	156			
1190	C ₆ H ₂ N ₃ O ₆	1, 2, 3-Trinitrobenzene.....	213.05	127.5			
1191	C ₆ H ₂ N ₃ O ₆	1, 2, 4-Trinitrobenzene.....	213.05	61		1.73 ^{15, 8}	
1192	C ₆ H ₂ N ₃ O ₆	1, 3, 5-Trinitrobenzene.....	213.05	121; 61	d.	1.688	
1193	C ₆ H ₂ N ₃ O ₆ S	Thiopicric acid.....	245.11	114	exp. 115		
1194	C ₆ H ₂ N ₃ O ₇	2, 3, 5-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH..	229.05	120			
1195	C ₆ H ₂ N ₃ O ₇	2, 3, 6-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH..	229.05	118			
1196	C ₆ H ₂ N ₃ O ₇	2, 4, 5-Trinitrophenol C ₆ H ₂ (NO ₂) ₃ OH..	229.05	96			
1197	C ₆ H ₂ N ₃ O ₇	Picric acid (NO ₂) ₃ C ₆ H ₂ OH.....	229.05	121.8	exp. > 300	1.763	1313
1198	C ₆ H ₂ N ₃ O ₈	Styphnic acid.....	245.05	180		1.829	
1199	C ₆ H ₂ N ₃ O ₈ S	Picrylsulfonic acid.....	293.11	100			
1200	C ₆ H ₂ N ₄ O ₈	2, 3, 4, 6-Tetranitroaniline.....	273.06	170	exp. 237	1.89	1314
1200.1	C ₆ H ₂ BrCl	o-Bromochlorobenzene.....	191.40	-12.6	204 ⁷⁴⁴	1.656 ^{12, 5}	765
1200.2	C ₆ H ₂ BrCl	m-Bromochlorobenzene.....	191.40	-21.2	196	1.627 ¹⁴	764
1200.3	C ₆ H ₂ BrCl	p-Bromochlorobenzene.....	191.40	67.4	196.3		
1200.4	C ₆ H ₂ BrI	o-Bromiodobenzene.....	282.88	2.1	257.4 ⁷⁴⁴		
1200.5	C ₆ H ₂ BrI	m-Bromiodobenzene.....	282.88	-9.3	252 ⁷⁴⁴		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1200. 6	C ₆ H ₄ BrI	<i>p</i> -Bromoiodobenzene	282.88	92	251.6 ⁷⁴		
1201	C ₆ H ₄ BrNO ₂	<i>o</i> -Bromonitrobenzene	201.96	43.0	261	1.623 ⁸⁰	
1202	C ₆ H ₄ BrNO ₂	<i>m</i> -Bromonitrobenzene	201.96	56.0	256.5	1.704	777
1203	C ₆ H ₄ BrNO ₂	<i>p</i> -Bromonitrobenzene	201.96	127	256		
1204	C ₆ H ₄ Br ₂	<i>o</i> -Dibromobenzene	235.86	1.8	221	1.966 ¹⁵	787
1205	C ₆ H ₄ Br ₂	<i>m</i> -Dibromobenzene	235.86	-6.9	217	1.955	783
1206	C ₆ H ₄ Br ₂	<i>p</i> -Dibromobenzene	235.86	86.8	219	1.954	1132
1207	C ₆ H ₄ Br ₂ O	2, 4-Dibromophenol	251.86	36	239		
1208	C ₆ H ₄ Br ₂ O	2, 6-Dibromophenol	251.86	56			
1209	C ₆ H ₄ Br ₂ O	3, 4-Dibromophenol	251.86	80			
1210	C ₆ H ₄ Br ₂ O	3, 5-Dibromophenol	251.83	76.5			
1211	C ₆ H ₄ Br ₂ O ₂	2, 4-Dibromoresorcinol	267.86	92.5			
1212	C ₆ H ₄ Br ₂ O ₂	4, 6-Dibromoresorcinol	267.86	112	130 (in CO ₂)		
1213	C ₆ H ₄ Br ₃ N	2, 4, 6-Tribromoaniline	329.79	119	300		
1214	C ₆ H ₄ Br ₃ N	3, 4, 5-Tribromoaniline	329.79	118			
1214. 1	C ₆ H ₄ ClI	<i>p</i> -Chloroiodobenzene	238.42	57	227.6 ⁷⁴¹		
1215	C ₆ H ₄ ClNO ₂	<i>o</i> -Chloronitrobenzene	157.50	32.5	245.7	1.365	
1216	C ₆ H ₄ ClNO ₂	<i>m</i> -Chloronitrobenzene	157.50	44.4; 23.7	235.6	1.534	
1217	C ₆ H ₄ ClNO ₂	<i>p</i> -Chloronitrobenzene	157.50	83.5	242	1.520	
1218	C ₆ H ₄ ClNO ₂	4-Chloro-2-nitrophenol	173.50	87			
1219	C ₆ H ₄ ClNO ₂	5-Chloro-2-nitrophenol	173.50	38.9			
1220	C ₆ H ₄ ClNO ₂	6-Chloro-2-nitrophenol	173.50	70			
1221	C ₆ H ₄ ClNO ₂	2-Chloro-3-nitrophenol	173.50	120			
1222	C ₆ H ₄ ClNO ₂	4-Chloro-3-nitrophenol	173.50	127			
1223	C ₆ H ₄ ClNO ₂	5-Chloro-3-nitrophenol	173.50	147			
1224	C ₆ H ₄ ClNO ₂	6-Chloro-3-nitrophenol	173.50	118			
1225	C ₆ H ₄ ClNO ₂	2-Chloro-4-nitrophenol	173.50	111			
1226	C ₆ H ₄ ClNO ₂	3-Chloro-4-nitrophenol	173.50	133			
1227	C ₆ H ₄ ClNO ₂ S	2-Chloronitrobenzene-5-sulfonic acid	237.56	>200 d.			
1228	C ₆ H ₄ ClNO ₂ S	5-Chloronitrobenzene-3-sulfonic acid	237.56	200 d.			
1229	C ₆ H ₄ Cl ₂	<i>o</i> -Dichlorobenzene	146.95	-17.6	179	1.298	731
1230	C ₆ H ₄ Cl ₂	<i>m</i> -Dichlorobenzene	146.95	-24.8	173	1.288	723
1231	C ₆ H ₄ Cl ₂	<i>p</i> -Dichlorobenzene	146.95	52.9	173	1.458	1101
1232	C ₆ H ₄ Cl ₂ O	2, 3-Dichlorophenol	162.95	57			
1233	C ₆ H ₄ Cl ₂ O	2, 4-Dichlorophenol	162.95	45	210		
1234	C ₆ H ₄ Cl ₂ O	2, 5-Dichlorophenol	162.95	58	211.7		
1235	C ₆ H ₄ Cl ₂ O	2, 6-Dichlorophenol	162.95	67	220		
1236	C ₆ H ₄ Cl ₂ O	3, 4-Dichlorophenol	162.95	68	253.5		
1237	C ₆ H ₄ Cl ₂ O	3, 5-Dichlorophenol	162.95	68	233.1		
1238	C ₆ H ₄ Cl ₂ O ₂	2, 3-Dichlorohydroquinone	178.95	145			
1239	C ₆ H ₄ Cl ₂ O ₂	2, 5-Dichlorohydroquinone	178.95	170		1.824	
1240	C ₆ H ₄ Cl ₂ O ₂	2, 6-Dichlorohydroquinone	178.95	164			
1241	C ₆ H ₄ Cl ₂ O ₂ S	2, 5-Dichlorobenzenesulfonic acid	227.01	97			
1242	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>o</i> -Benzenedisulfonyl chloride	275.08	105			
1243	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>m</i> -Benzenedisulfonyl chloride	275.08	63			
1244	C ₆ H ₄ Cl ₂ O ₂ S ₂	<i>p</i> -Benzenedisulfonyl chloride	275.08	131			
1245	C ₆ H ₄ Cl ₃ N	2, 3, 4-Trichloroaniline	196.41	67.5	291.5		
1246	C ₆ H ₄ Cl ₃ N	2, 4, 5-Trichloroaniline	196.41	96	270		
1247	C ₆ H ₄ Cl ₃ N	2, 4, 6-Trichloroaniline	196.41	77.5	262.4		
1248	C ₆ H ₄ Cl ₃ N	3, 4, 5-Trichloroaniline Cl ₃ C ₆ H ₂ NH ₂	196.41	100			
1249	C ₆ H ₄ FNO ₂	<i>o</i> -Fluoronitrobenzene	141.04	-5.9	214.6	1.338	700
1250	C ₆ H ₄ FNO ₂	<i>m</i> -Fluoronitrobenzene	141.04	1.7	205	1.327	688
1251	C ₆ H ₄ FNO ₂	<i>p</i> -Fluoronitrobenzene	141.04	26.5; 21.5	205	1.326	1084
1252	C ₆ H ₄ F ₂	<i>m</i> -Difluorobenzene	114.03		83	1.172	384
1253	C ₆ H ₄ F ₂	<i>p</i> -Difluorobenzene	114.03	-23.7	88.9	1.164	362
1254	C ₆ H ₄ INO ₂	<i>o</i> -Iodonitrobenzene	248.97	49.4	290	1.810 ^{15.5}	
1255	C ₆ H ₄ INO ₂	<i>m</i> -Iodonitrobenzene	248.97	36	280	1.804 ^{15.5}	
1256	C ₆ H ₄ INO ₂	<i>p</i> -Iodonitrobenzene	248.97	171.5	288.1	1.809 ^{15.5}	
1257	C ₆ H ₄ INO ₂	4-Iodo-6-nitrophenol IC ₆ H ₃ (NO ₂)OH	264.97	81			
1258	C ₆ H ₄ I ₂	<i>o</i> -Diiodobenzene	329.90	23.4	286.8		
1259	C ₆ H ₄ I ₂	<i>m</i> -Diiodobenzene	329.90	34.2	284.8		
1260	C ₆ H ₄ I ₂	<i>p</i> -Diiodobenzene	329.90	129.4	285		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1261	C ₆ H ₄ I ₂ O	2, 4-Diiodophenol	345.90	72	100		
1262	C ₆ H ₄ I ₂ O	2, 6-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	68			
1263	C ₆ H ₄ I ₂ O	3, 4-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	83			
1264	C ₆ H ₄ I ₂ O	3, 5-Diiodophenol I ₂ C ₆ H ₃ OH	345.90	104			
1265	C ₆ H ₄ I ₂ O ₄ S	2, 6-Diiodophenol-4-sulfonic acid	425.96	120	190 d.		
1266	C ₆ H ₄ I ₂ N	2, 4, 6-Triiodoaniline I ₃ C ₆ H ₂ NH ₂	470.84	185.5			
1267	C ₆ H ₄ N ₂	Pyridyl-2-cyanide CN.C ₆ H ₄ N	104.05	29			
1268	C ₆ H ₄ N ₂	Pyridyl-3-cyanide CN.C ₆ H ₄ N	104.05	50			
1269	C ₆ H ₄ N ₂	Pyridyl-4-cyanide CN.C ₆ H ₄ N	104.05	79			
1270	C ₆ H ₄ N ₂ O	<i>p</i> -Diazophenol	120.05	exp. 38			
1271	C ₆ H ₄ N ₂ O ₄	<i>o</i> -Dinitrobenzene	168.05	116.5	319	1.59	
1272	C ₆ H ₄ N ₂ O ₄	<i>m</i> -Dinitrobenzene	168.05	89.7	302	1.575	
1273	C ₆ H ₄ N ₂ O ₄	<i>p</i> -Dinitrobenzene	168.05	172.1	299	1.625	
1274	C ₆ H ₄ N ₂ O ₄	2, 3-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	144			
1275	C ₆ H ₄ N ₂ O ₄	2, 4-Dinitrophenol	184.05	111.6		1.683	
1276	C ₆ H ₄ N ₂ O ₄	2, 5-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	104			
1277	C ₆ H ₄ N ₂ O ₄	2, 6-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	61.8			
1278	C ₆ H ₄ N ₂ O ₄	3, 4-Dinitrophenol (NO ₂) ₂ C ₆ H ₃ OH	184.05	134			
1279	C ₆ H ₄ N ₂ O ₄	3, 5-Dinitrophenol	184.05	126.1			
1280	C ₆ H ₄ N ₂ O ₄	2, 4-Dinitroresorcinol	200.05	148	d.		
1281	C ₆ H ₄ N ₂ O ₄	4, 6-Dinitroresorcinol	200.05	215			
1282	C ₆ H ₄ N ₂ O ₇ S	2, 4-Dinitrobenzenesulfonic acid	248.11	108			
1283	C ₆ H ₄ N ₂ S	Benzisothiodiazole	136.11	44	206		
1284	C ₆ H ₄ N ₄ O ₆	Picramide 2, 4, 6-(NO ₂) ₂ C ₆ H ₂ NH ₂	228.06	188			
1285	C ₆ H ₄ N ₄ O ₇	2, 4, 6-Trinitroaminophenol	244.06	178			
1286	C ₆ H ₄ N ₆	Hexaazobenzene	160.08	83			
1287	C ₆ H ₄ O ₂	Quinone	108.03	115.7		1.318	
1288	C ₆ H ₄ O ₄	2, 5-Dihydroxyquinone	140.03	220			
1289	C ₆ H ₄ O ₆	Sarsapic acid	172.03	305			
1290	C ₆ H ₄ O ₈	Ethanetetracarboxylic acid	204.03	169 d.			
1291	C ₆ H ₅ AsCl ₂	Phenyl dichloroarsine	222.92		253		
1292	C ₆ H ₅ AsO	Phenylarsine oxide	168.00	120			
1294	C ₆ H ₅ Br	Bromobenzene	156.96	-30.6	156.2	1.497	747
1295	C ₆ H ₅ BrN ₂ O ₂	4-Bromo-2-nitroaniline	216.97	111			
1296	C ₆ H ₅ BrO	<i>o</i> -Bromophenol	172.96	5.6	195	1.553 ⁸⁰	
1297	C ₆ H ₅ BrO	<i>m</i> -Bromophenol	172.96	33	236.5		
1298	C ₆ H ₅ BrO	<i>p</i> -Bromophenol	172.96	63.5	238	1.588 ⁸⁰	
1299	C ₆ H ₅ BrO ₂	Bromohydroquinone	188.96	115			
1300	C ₆ H ₅ BrO ₂	2(4)-Bromoresorcinol	188.96	91			
1301	C ₆ H ₅ BrO ₂ S	<i>p</i> -Bromobenzenesulfonic acid	237.02	88			
1302	C ₆ H ₅ Br ₂ N	2, 4-Dibromoaniline	250.88	79.5			
1303	C ₆ H ₅ Br ₂ N	2, 5-Dibromoaniline	250.88	52			
1304	C ₆ H ₅ Br ₂ N	2, 6-Dibromoaniline	250.88	84	264		
1305	C ₆ H ₅ Br ₂ N	3, 4-Dibromoaniline	250.88	80.4			
1306	C ₆ H ₅ Br ₂ N	3, 5-Dibromoaniline	250.88	56.5			
1307	C ₆ H ₅ Cl	Chlorobenzene	112.50	-45.2	132.1	1.107	681
1308	C ₆ H ₅ ClN ₂ O ₂	2-Chloro-4-nitroaniline	172.51	105			
1309	C ₆ H ₅ ClN ₂ O ₂	2-Chloro-5-nitroaniline	172.51	118			
1310	C ₆ H ₅ ClN ₂ O ₂	3-Chloro-4-nitroaniline	172.51	157			
1311	C ₆ H ₅ ClN ₂ O ₂	3-Chloro-6-nitroaniline	172.51	125			
1312	C ₆ H ₅ ClN ₂ O ₂	4-Chloro-2-nitroaniline	172.51	115			
1313	C ₆ H ₅ ClN ₂ O ₂	4-Chloro-3-nitroaniline	172.51	103			
1314	C ₆ H ₅ ClO	<i>o</i> -Chlorophenol	128.50	α 7; β 0; γ -4.1	173	1.241 ^{18, 2}	1058
1315	C ₆ H ₅ ClO	<i>m</i> -Chlorophenol	128.50	32.8	214		1059
1316	C ₆ H ₅ ClO	<i>p</i> -Chlorophenol	128.50	37	217	1.306	1060
1317	C ₆ H ₅ ClO ₂	Chlorohydroquinone	144.50	106	263		
1318	C ₆ H ₅ ClO ₂ S	Benzenesulfone chloride	176.56	14.5	247	1.383 ¹⁸	
1319	C ₆ H ₅ ClO ₂ S	<i>p</i> -Chlorobenzenesulfonic acid	192.56	67	146 ²⁵		
1320	C ₆ H ₅ Cl ₂ N	2, 3-Dichloroaniline	161.96	24	252		
1321	C ₆ H ₅ Cl ₂ N	2, 4-Dichloroaniline	161.96	63	245	1.567	
1322	C ₆ H ₅ Cl ₂ N	2, 5-Dichloroaniline	161.96	50	251		
1323	C ₆ H ₅ Cl ₂ N	2, 6-Dichloroaniline Cl ₂ C ₆ H ₃ NH ₂	161.96	39			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1324	C ₆ H ₄ Cl ₂ N	3, 4-Dichloroaniline.....	161.96	71.5	272		
1325	C ₆ H ₄ Cl ₂ N	3, 5-Dichloroaniline.....	161.96	50.5	260		
1326	C ₆ H ₄ Cl ₂ OP	Phosphenyl oxychloride.....	194.98		258	1.375	
1327	C ₆ H ₄ Cl ₂ P	Phosphenyl chloride.....	178.98		224.6	1.319	804
1328	C ₆ H ₅ F	Fluorobenzene.....	96.039	-41.2	86	1.024	487
1329	C ₆ H ₄ FO	<i>o</i> -Fluorophenol FC ₆ H ₄ OH.....	112.04	16.1			
1330	C ₆ H ₄ FO	<i>m</i> -Fluorophenol.....	112.04	13.8	183 ⁶⁹	1.222	652
1331	C ₆ H ₄ FO	<i>p</i> -Fluorophenol.....	112.04	28.5; -48.2	188	1.189 ¹⁶	1083
1332	C ₆ H ₄ F ₂ N	2, 5-Difluoroaniline.....	129.05	13.5	85.8 ³⁰	1.288 ^{17.2}	
1333	C ₆ H ₅ I	Iodobenzene.....	203.97	-31.4	188.6	1.832	792
1334	C ₆ H ₄ IO	<i>o</i> -Iodophenol.....	219.97	40.4	187 ¹⁶⁰	1.876 ³⁰	
1335	C ₆ H ₄ IO	<i>m</i> -Iodophenol IC ₆ H ₄ OH.....	219.97	40			
1336	C ₆ H ₄ IO	<i>p</i> -Iodophenol IC ₆ H ₄ OH.....	219.97	94			
1337	C ₆ H ₄ IO	Iodosobenzene.....	219.97	exp. 210			
1338	C ₆ H ₄ IO ₂	Iodoxybenzene.....	235.97	exp. 238			
1339	C ₆ H ₄ IO ₂ S	Benzenesulfone iodide C ₆ H ₄ SO ₂ I.....	268.04	45			
1340	C ₆ H ₄ I ₂ N	2, 4-Diiodoaniline I ₂ C ₆ H ₃ NH ₂	344.91	96			
1341	C ₆ H ₄ NO	Pyridyl- α -aldehyde.....	107.05		181	1.126	947
1342	C ₆ H ₄ NO	Pyridyl- β -aldehyde.....	107.05		97 ¹⁵		
1343	C ₆ H ₄ NO	Nitrosobenzene.....	107.05	68	59 ¹⁸		
1344	C ₆ H ₄ NO ₂	Picolinic acid.....	123.05	137			
1345	C ₆ H ₄ NO ₂	Nicotinic acid.....	123.05	232			
1346	C ₆ H ₄ NO ₂	Isonicotinic acid.....	123.05	317			
1347	C ₆ H ₄ NO ₂	Nitrobenzene.....	123.05	5.7	210.9	1.207	736
1348	C ₆ H ₄ NO ₂	<i>p</i> -Nitrosophenol ONC ₆ H ₄ OH.....	123.05	126			
1349	C ₆ H ₄ NO ₂	<i>o</i> -Nitrophenol.....	139.05	45	214.5	1.447	
1350	C ₆ H ₄ NO ₂	<i>m</i> -Nitrophenol.....	139.05	96	194 ⁷⁰	1.485	
1351	C ₆ H ₄ NO ₂	<i>p</i> -Nitrophenol.....	139.05	113		1.468	
1352	C ₆ H ₄ NO ₄	2-Nitroresorcinol <i>m</i> -(OH) ₂ C ₆ H ₃ NO ₂	155.05	85			
1353	C ₆ H ₄ NO ₄	4-Nitroresorcinol <i>m</i> -(OH) ₂ C ₆ H ₃ NO ₂	155.05	115			
1354	C ₆ H ₄ NO ₄	Nitrohydroquinone.....	155.05	134			
1355	C ₆ H ₄ NO ₄ S	2-Nitrophenol-4-sulfonic acid.....	219.11	141			
1356	C ₆ H ₄ N ₂	Aziminobenzene.....	119.06	99			
1357	C ₆ H ₄ N ₂	Triazobenzene.....	119.06		73.5 ²⁴	1.098 ¹⁰	991
1358	C ₆ H ₃ N ₂ O ₄	2, 3-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	127			
1359	C ₆ H ₃ N ₂ O ₄	2, 4-Dinitroaniline.....	183.06	188			
1360	C ₆ H ₃ N ₂ O ₄	2, 5-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	137			
1361	C ₆ H ₃ N ₂ O ₄	2, 6-Dinitroaniline.....	183.06	138			
1362	C ₆ H ₃ N ₂ O ₄	3, 4-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	154			
1363	C ₆ H ₃ N ₂ O ₄	3, 5-Dinitroaniline (NO ₂) ₂ C ₆ H ₃ NH ₂	183.06	159			
1364	C ₆ H ₃ N ₂ O ₄	Picramic acid.....	199.06	165			1320
1365	C ₆ H ₆	Benzene.....	78.046	5.5	79.6	0.878	606
1366	C ₆ H ₆	Dipropargyl.....	78.046	-6	85.4	0.805	380
1367	C ₆ H ₄ AsCl ₃	Tri-(2-chlorovinyl)arsine.....	259.38		260	1.572	
1368	C ₆ H ₄ BrN	<i>o</i> -Bromoaniline.....	171.97	31.5	251		
1369	C ₆ H ₄ BrN	<i>m</i> -Bromoaniline.....	171.97	18.5	251	1.587 ^{14.3}	793
1370	C ₆ H ₄ BrN	<i>p</i> -Bromoaniline BrC ₆ H ₄ NH ₂	171.97	66.4			
1371	C ₆ H ₃ Br ₂ N ₂	3, 4-Dibromophenylhydrazine.....	265.89	75			
1372	C ₆ H ₃ Br ₂ N ₂	3, 5-Dibromophenylhydrazine.....	265.89	95.5			
1373	C ₆ H ₄ Br ₆	α - <i>trans</i> -Benzenehexabromide.....	557.54	212			
1374	C ₆ H ₄ Br ₆	β - <i>cis</i> -Benzenehexabromide.....	557.54	253			
1375	C ₆ H ₄ ClN	<i>o</i> -Chloroaniline ClC ₆ H ₄ NH ₂	127.51	0	210.5	1.213	774
1376	C ₆ H ₄ ClN	<i>m</i> -Chloroaniline.....	127.51	-10.4	229.8	1.215	776
1377	C ₆ H ₄ ClN	<i>p</i> -Chloroaniline.....	127.51	71	231	1.170 ⁷⁰	
1378	C ₆ H ₃ ClNO	2-Chloro-3-aminophenol.....	143.51	87			
1379	C ₆ H ₃ ClNO	2-Chloro-4-aminophenol.....	143.51	153			
1380	C ₆ H ₃ ClNO ₂ S	<i>p</i> -Chlorometanilic acid.....	207.58	280 d.			
1381	C ₆ H ₄ Cl ₂ N ₂	2, 4-Dichlorophenylhydrazine.....	176.98	94			
1382	C ₆ H ₄ Cl ₂ N ₂	2, 5-Dichlorophenylhydrazine.....	176.98	105			
1383	C ₆ H ₄ Cl ₂ N ₂	3, 5-Dichlorophenylhydrazine.....	176.98	118			
1384	C ₆ H ₄ Cl ₆	α - <i>trans</i> -Benzenehexachloride.....	290.79	157	288	1.87	
1385	C ₆ H ₄ Cl ₆	β - <i>cis</i> -Benzenehexachloride.....	290.79	310		1.89 ¹⁰	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1386	C ₆ H ₆ Cl ₆	γ-Benzenehexachloride.....	290.79	112			
1387	C ₆ H ₆ Cl ₆	δ-Benzenehexachloride.....	290.79	129			
1388	C ₆ H ₅ FN	o-Fluoroaniline.....	111.05	-34.6	68.5 ¹⁴	1.151	716
1389	C ₆ H ₅ FN	m-Fluoroaniline.....	111.05		186.3	1.160	722
1390	C ₆ H ₅ FN	p-Fluoroaniline.....	111.05	-1.9	189	1.152	707
1391	C ₆ H ₅ IN	o-Iodoaniline.....	218.99	56.5			
1392	C ₆ H ₅ IN	m-Iodoaniline.....	218.99	27			
1393	C ₆ H ₅ IN	p-Iodoaniline.....	218.99	62			
1394	C ₆ H ₅ N ₂ O	p-Nitrosoaniline.....	122.06	174			
1395	C ₆ H ₅ N ₂ O ₂	Phenylnitroamine.....	138.06	46			
1396	C ₆ H ₅ N ₂ O ₂	o-Nitroaniline.....	138.06	71.5			
1397	C ₆ H ₅ N ₂ O ₂	m-Nitroaniline O ₂ NC ₆ H ₄ NH ₂	138.06	111.8	286	1.430	
1398	C ₆ H ₅ N ₂ O ₂	p-Nitroaniline.....	138.06	148		1.424	
1399	C ₆ H ₅ N ₂ O ₂	Quinonedioxime p-C ₆ H ₄ (NOH) ₂	138.06	240			
1400	C ₆ H ₅ N ₂ O ₂	3-Nitro-2-aminophenol.....	154.06	136			
1401	C ₆ H ₅ N ₂ O ₂	4-Nitro-2-aminophenol.....	154.06	143			
1402	C ₆ H ₅ N ₂ O ₂	5-Nitro-2-aminophenol.....	154.06	202			
1403	C ₆ H ₅ N ₂ O ₂	6-Nitro-2-aminophenol.....	154.06	111			
1404	C ₆ H ₅ N ₂ O ₂	5-Nitro-3-aminophenol.....	154.06	165			
1405	C ₆ H ₅ N ₂ O ₂	2-Nitro-4-aminophenol.....	154.06	206			
1406	C ₆ H ₅ N ₂ O ₂	3-Nitro-4-aminophenol.....	154.06	148			
1407	C ₆ H ₅ N ₂ O ₄	5-Acetylbarbituric acid.....	170.06	300			
1408	C ₆ H ₅ N ₂ O ₄	Dimethylalloxan.....	170.06	255 d.			
1409	C ₆ H ₅ N ₂ O ₄	1-Methyluric acid.....	182.08	400 d.			
1410	C ₆ H ₅ N ₂ O ₄	3-Methyluric acid.....	182.08	>360 d.			
1411	C ₆ H ₅ N ₂ O ₄	7-Methyluric acid.....	182.08	370 d.			
1412	C ₆ H ₅ N ₄ O ₇	Ammonium picrate.....	246.08	d.		1.719	1318
1413	C ₆ H ₆ O	Phenol.....	94.046	41	182	1.071 ¹⁵	1064
1414	C ₆ H ₆ O ₂	o-Dihydroxybenzene 1, 2-C ₆ H ₄ (OH) ₂ *.....	110.05	105	245	1.344	1272
1415	C ₆ H ₆ O ₂	Resorcinol 1, 3-C ₆ H ₄ (OH) ₂	110.05	110	276.5	1.285 ¹⁶	1275
1416	C ₆ H ₆ O ₂	Hydroquinol 1, 4-C ₆ H ₄ (OH) ₂	110.05	170.5	286.2	1.332 ¹⁶	1184
1417	C ₆ H ₆ O ₂	5-Methylfurfural.....	110.05		187	1.109 ¹⁶	
1418	C ₆ H ₆ O ₂ S	Benzenesulfinic acid.....	142.11	84	100 d.		
1419	C ₆ H ₆ O ₂	Pyrogallol 1, 2, 3-C ₆ H ₃ (OH) ₃	126.05	134	309	1.453	1333
1420	C ₆ H ₆ O ₂	Hydroxyhydroquinone.....	126.05	140.5			
1421	C ₆ H ₆ O ₂	Phloroglucinol.....	126.05	219			
1422	C ₆ H ₆ O ₂	Acrylic anhydride.....	126.05		97 ¹⁶	1.094 ⁰	
1423	C ₆ H ₆ O ₂ S	Benzenesulfonic acid.....	158.11	46	d.		
1424	C ₆ H ₆ O ₄	Apionol 1, 2, 3, 4-C ₆ H ₂ (OH) ₄	142.05	161			
1425	C ₆ H ₆ O ₄	1, 2, 3, 5-Tetrahydroxybenzene.....	142.05	165			
1426	C ₆ H ₆ O ₄	1, 2, 4, 5-Tetrahydroxybenzene.....	142.05	220			
1427	C ₆ H ₆ O ₄	Muconic acid (CH:CHCO ₂ H) ₂	142.05	320 d.			
1428	C ₆ H ₆ O ₄ S	o-Phenolsulfonic acid.....	174.11	50			
1429	C ₆ H ₆ O ₄	Aconitic acid.....	174.05	191			
1430	C ₆ H ₆ S	Thiophenol C ₆ H ₅ SH.....	110.11		169.5	1.074	1002
1431	C ₆ H ₆ Se	Selenophenol C ₆ H ₅ SeH.....	157.25		183.6	1.487 ¹⁶	
1432	C ₆ H ₆ S ₂	Dithioresorcinol 1, 3-C ₆ H ₄ (SH) ₂	142.18	27	243		
1433	C ₆ H ₆ S ₂	Dithiohydroquinone 1, 4-C ₆ H ₄ (SH) ₂	142.18	98			
1434	C ₆ H ₇ As	Phenylarsine C ₆ H ₅ AsH ₂	154.01		148		
1435	C ₆ H ₇ AsO ₂	Phenylarsonic acid.....	202.01	158 d.		1.840	
1436	C ₆ H ₇ BrN ₂	p-Bromophenylhydrazine.....	186.99	107			
1437	C ₆ H ₇ ClN ₂	4-Chloro-o-phenylenediamine.....	142.53	72			
1438	C ₆ H ₇ ClN ₂	4-Chloro-m-phenylenediamine.....	142.53	86			
1439	C ₆ H ₇ ClN ₂	o-Chlorophenylhydrazine.....	142.53	47			
1440	C ₆ H ₇ ClN ₂	p-Chlorophenylhydrazine.....	142.53	90			
1441	C ₆ H ₇ ClO	Sorbic chloride.....	130.51		78 ¹⁶	1.065	741
1441.1	C ₆ H ₇ ClO ₄	Methyl chloromaleate.....	178.51		106.5 ¹⁶	1.278 ²⁵	
1441.2	C ₆ H ₇ ClO ₄	Methyl chlorofumarate.....	178.51		115.5 ¹⁶	1.290 ²⁵	
1442	C ₆ H ₇ N	Aniline.....	93.062	-6.2	184.4	1.022	769
1443	C ₆ H ₇ N	α-Picoline.....	93.062	-69.9	128.0	0.950	604
1444	C ₆ H ₇ N	β-Picoline.....	93.062		143.5	0.952	1018
1445	C ₆ H ₇ N	γ-Picoline.....	93.062		143.1	0.957	
1446	C ₆ H ₇ NO	o-Aminophenol.....	109.06	170			

* Commonly known as catechol, pyrocatechol, catechin, pyrocatechin.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1447	C ₆ H ₇ NO	<i>m</i> -Aminophenol.....	109.06	123			
1448	C ₆ H ₇ NO	<i>p</i> -Aminophenol.....	109.06	184			1333
1449	C ₆ H ₇ NO	Methyl 2-pyrrol ketone.....	109.06	90	220		
1450	C ₆ H ₇ NO	β -Phenylhydroxylamine.....	109.06	82			
1451	C ₆ H ₇ NO ₂	Phloramine 3, 5-(OH) ₂ C ₆ H ₃ NH ₂	125.06	152			
1452	C ₆ H ₇ NO ₂ S	Benzenesulfoneamide.....	157.13	156			
1455	C ₆ H ₇ NO ₂ S	<i>p</i> -Anilinesulfonic acid.....	173.13	288			
1458	C ₆ H ₇ NS	2-Aminothiophenol.....	125.13	26	234		
1459	C ₆ H ₇ N ₂ O ₂	4-Nitro- <i>o</i> -phenylenediamine.....	153.08	198			
1460	C ₆ H ₇ N ₂ O ₂	4-Nitro- <i>m</i> -phenylenediamine.....	153.08	161			
1461	C ₆ H ₇ N ₂ O ₂	2-Nitro- <i>p</i> -phenylenediamine.....	153.08	135			
1462	C ₆ H ₇ N ₂ O ₁₄	<i>d</i> -Glucose pentanitrate.....	405.09	135 d.			
1463	C ₆ H ₇ O ₂ P	Phenylphosphinous acid.....	142.08	70			
1464	C ₆ H ₇ O ₂ P	Phenylphosphenic acid.....	158.08	158	250 d.	1.475	
1465	C ₆ H ₇ P	Phenyl phosphine C ₆ H ₅ PH ₂	110.08		160	1.001 ¹⁴	
1466	C ₆ H ₈	1, 3-Cyclohexadiene.....	80.062	-98	80.5	0.842	519
1467	C ₆ H ₈	Diallylene (CH ₂ C:CH) ₂	80.062		70	0.858 ^{16,2}	
1468	C ₆ H ₈	<i>o</i> -Dihydrobenzene.....	80.062		78.5	0.848	
1469	C ₆ H ₈	<i>m</i> -Dihydrobenzene.....	80.062		80.5	0.830	
1470	C ₆ H ₈	<i>p</i> -Dihydrobenzene.....	80.062		85.5	0.848	
1471	C ₆ H ₈ AsNO ₂	Arsanilic acid <i>p</i> -NH ₂ C ₆ H ₄ AsO(OH) ₂	217.03	<200			
1471. 1	C ₆ H ₈ BrN	Aniline hydrobromide.....	173.99	286			
1472	C ₆ H ₈ ClN	Aniline hydrochloride.....	129.53	198	245	1.222 ⁴	1245
1474	C ₆ H ₈ ClNO	<i>m</i> -Aminophenol hydrochloride.....	145.53	229			
1475	C ₆ H ₈ ClNO	<i>p</i> -Aminophenol hydrochloride.....	145.53	306 d.			1333
1476	C ₆ H ₈ Cl ₂ O ₂	Adipyl dichloride.....	182.98		132 ¹⁸ s. d.		
1477	C ₆ H ₈ N	Piturine.....	94.070		244		
1478	C ₆ H ₈ N ₂	Adipyl dinitrile.....	108.08	1	295	0.951 ¹⁹	471
1479	C ₆ H ₈ N ₂	<i>o</i> -Phenylenediamine.....	108.08	103.8	252		
1480	C ₆ H ₈ N ₂	<i>m</i> -Phenylenediamine.....	108.08	62.8	287	1.107 ^{7,7}	1086
1481	C ₆ H ₈ N ₂	<i>p</i> -Phenylenediamine.....	108.08	139.7	267		
1482	C ₆ H ₈ N ₂	2, 5-Dimethylpyrazine (Ketene).....	108.08	15	155	0.990	1017
1483	C ₆ H ₈ N ₂	Phenylhydrazine C ₆ H ₅ NHNH ₂	108.08	19.6	243.5	1.098	784
1484	C ₆ H ₈ N ₂ O	2, 5-Diaminophenol.....	124.08	68			
1485	C ₆ H ₈ N ₂ O	3, 4-Diaminophenol.....	124.08	168			
1486	C ₆ H ₈ N ₂ O	3, 5-Diaminophenol.....	124.08	170			
1487	C ₆ H ₈ N ₂ O ₃	1, 3-Dimethylbarbituric acid.....	156.08	123			
1488	C ₆ H ₈ N ₂ O ₃	1-Ethylbarbituric acid.....	156.08	120			
1489	C ₆ H ₈ N ₂ O ₃	Aniline nitrate.....	156.08		190 d.	1.358 ⁴	
1490	C ₆ H ₈ N ₂ O ₃ S	<i>o</i> -Phenylenediamine-3-sulfonic acid.....	188.14	d.			
1491	C ₆ H ₈ N ₂ O ₃ S	<i>p</i> -Phenylhydrazinesulfonic acid.....	188.14	286			
1492	C ₆ H ₈ N ₂ O ₄ S ₂	<i>o</i> -Benzenedisulfoneamide.....	236.21	233			
1493	C ₆ H ₈ N ₂ O ₄ S ₂	<i>m</i> -Benzenedisulfoneamide.....	236.21	229			
1494	C ₆ H ₈ N ₂ O ₄ S ₂	<i>p</i> -Benzenedisulfoneamide.....	236.21	188			
1495	C ₆ H ₈ N ₂ O ₁₈	Mannitol hexanitrate.....	452.11	113		1.8	
1496	C ₆ H ₈ O	2, 5-Dimethylfuran.....	96.062		94	0.888	974
1497	C ₆ H ₈ O ₂	Dihydroresorcinol <i>m</i> -(OH) ₂ C ₆ H ₄	112.06	104			
1498	C ₆ H ₈ O ₂	Sorbic acid CH ₃ (CH:CH) ₂ CO ₂ H.....	112.06	134.5	228 d.		1333
1499	C ₆ H ₈ O ₄	Dimethyl fumarate.....	144.06	102	192		
1500	C ₆ H ₈ O ₄	Dimethyl maleate.....	144.06		203	1.153 ¹⁴	382
1501	C ₆ H ₈ O ₄	Ethyl fumarate CO ₂ HCH:CHCO ₂ C ₂ H ₅	144.06	70			
1502	C ₆ H ₈ O ₄	Lactide.....	144.06	125	255	0.862	
1503	C ₆ H ₈ O ₄	Acetonylmaleonic acid.....	160.06	150			
1504	C ₆ H ₈ O ₄	Acetylmaleic acid.....	160.06	134			
1504. 1	C ₆ H ₈ O ₄	1-Ketoadipic acid.....	160.06	124			
1505	C ₆ H ₈ O ₄	Tricarballic acid.....	176.06	166	d.		
1506	C ₆ H ₈ O ₄	Glycerol triformate (Triformin).....	176.06	18	266	1.320	373
1507	C ₆ H ₈ O ₇	Citric acid (HO ₂ CCH ₂) ₂ C(OH)CO ₂ H.....	192.06	153		1.542	1202
1508	C ₆ H ₈ O ₈	Hydroxycitric acid.....	208.06	160			
1509	C ₆ H ₈ S	2, 3-Dimethylthiophene.....	112.13		137	0.994	
1510	C ₆ H ₈ S	2, 4-Dimethylthiophene.....	112.13		138	0.996	
1511	C ₆ H ₈ S	2, 5-Dimethylthiophene.....	112.13		137.5	0.976 ^{17,4}	
1512	C ₆ H ₈ S	3, 4-Dimethylthiophene.....	112.13		146	1.008 ^{21,4}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1513	C ₆ H ₈ AsO ₆	Arsenic acetate	252.03	82	170 ³¹		
1514	C ₆ H ₈ ClN ₂	Phenylhydrazine hydrochloride	144.54	243			
1515	C ₆ H ₈ ClO ₂	Ethyl chloroacetoacetate	164.53		200	1.179 ²⁵	
1516	C ₆ H ₈ N	1, 2-Dimethylpyrrol	95.077		65 ¹⁴		
1517	C ₆ H ₈ N	2, 3-Dimethylpyrrol	95.077		165		
1518	C ₆ H ₈ N	2, 4-Dimethylpyrrol	95.077		171	0.927 ¹⁴	829
1519	C ₆ H ₈ N	2, 5-Dimethylpyrrol	95.077		169	0.935	909
1520	C ₆ H ₈ N	1-Ethylpyrrol	95.077		131	0.888 ¹⁶	
1521	C ₆ H ₈ NO ₂	Guavacine	127.08	285 d.			
1522	C ₆ H ₈ NO ₂	Triacetamide (CH ₃ CO) ₂ N	143.08	79			
1523	C ₆ H ₈ NO ₂ S	Ammonium benzenesulfonate	175.14	256			
1524	C ₆ H ₈ NO ₂ S	<i>m</i> -Aminophenol sulfate	207.14	152			
1525	C ₆ H ₈ N ₃	1, 2, 3-Triaminobenzene	123.09	103	336		
1526	C ₆ H ₈ N ₃	1, 2, 4-Triaminobenzene	123.09	100	340		
1527	C ₆ H ₈ N ₃ O	2, 4, 6-Triaminophenol	139.09		257		
1528	C ₆ H ₈ N ₃ O ₂	Cupferron	155.09	164			
1529	C ₆ H ₈ N ₃ O ₂	Histidine	155.09	253 d.			
1530	C ₆ H ₈ N ₃ O ₃	Phloroglucinol trioxime	171.09	155 exp.			
1531	C ₆ H ₈ N ₃ O ₄	Caffuric acid	187.09	220			
1532	C ₆ H ₁₀	<i>n</i> -Butylacetylene C ₄ H ₉ C:CH	82.077	-150	71.5		
1533	C ₆ H ₁₀	Diisopropenyl (CH ₃ C:CH ₂) ₂	82.077		69.6	0.731 ¹⁸	852
1534	C ₆ H ₁₀	1, 5-Hexadiene (CH ₃ CH:CH ₂) ₂	82.077		60	0.688	127
1535	C ₆ H ₁₀	2, 4-Hexadiene (CH:CHCH ₂) ₂	82.077		82	0.718	819
1536	C ₆ H ₁₀	Methylpropylacetylene CH ₃ CC:C ₃ H ₇	82.077		84	0.749 ⁹	
1537	C ₆ H ₁₀	1, 2, 3, 4-Tetrahydrobenzene	82.077	-103.7	83	0.810	404
1539	C ₆ H ₁₀ ClN ₂ O ₂	Histidine hydrochloride	191.56	251 d.			
1540	C ₆ H ₁₀ N ₄ O ₁₂	Tetranitrodiglycerol	346.11		250 ⁸	1.33	
1541	C ₆ H ₁₀ O	Cyclohexanone	98.077		156.7	0.949	874
1542	C ₆ H ₁₀ O	1, 2, 3, 4-Tetrahydrophenol	98.077		166 d.		
1543	C ₆ H ₁₀ O	1, 2, 3, 6-Tetrahydrophenol	98.077		166		
1544	C ₆ H ₁₀ O	Allyl ether (CH ₂ :CHCH ₂) ₂ O	98.077		94.3	0.805	
1545	C ₆ H ₁₀ O	1-Ethyl-2-methylacrolein	98.077		137.3	0.858	
1546	C ₆ H ₁₀ O	Allylacetone CH ₂ :CH(CH ₃)COCH ₃	98.077		129.5	0.846	876
1547	C ₆ H ₁₀ O	Diethylketene (C ₂ H ₅) ₂ C:CO	98.077		89.5	0.831	
1548	C ₆ H ₁₀ O	Mesityl oxide (CH ₃) ₂ C:CHCOCH ₃	98.077	-59.0	135	0.863	899
1549	C ₆ H ₁₀ O ₂	Adipyl dialdehyde OCH(CH ₂) ₄ CHO	114.08		94 ⁹		
1550	C ₆ H ₁₀ O ₂	Propionylpropionic aldehyde	114.08	40	166		
1551	C ₆ H ₁₀ O ₂	Acetonylacetone (CH ₃ COCH ₂) ₂	114.08	-9	194	0.970	428
1552	C ₆ H ₁₀ O ₂	α-Ethylcrotonic acid	114.08	45	209		
1553	C ₆ H ₁₀ O ₂	1, 2-Hexenic acid C ₆ H ₇ CH:CHCO ₂ H	114.08	32	217	0.965	1055
1554	C ₆ H ₁₀ O ₂	2, 3-Hexenic acid	114.08		208	0.962	953
1555	C ₆ H ₁₀ O ₂	1, 2-Isohexenic acid	114.08		108 ¹²	0.959	885
1556	C ₆ H ₁₀ O ₂	Crotonyl acetate	114.08		129	0.934 ⁹	
1557	C ₆ H ₁₀ O ₂	Ethyl α-crotonate	114.08		139	0.919	283
1558	C ₆ H ₁₀ O ₂	Ethyl isocrotonate	114.08		131.2	0.925	
1559	C ₆ H ₁₀ O ₂	Glyceryl ether	130.08		173	1.091	
1560	C ₆ H ₁₀ O ₂	Propionic anhydride (CH ₃ CH ₂ CO) ₂ O	130.08	-45.0	196.0	1.012	142
1561	C ₆ H ₁₀ O ₂	Ethyl acetoacetate	130.08	< -80	180	1.025	243
1562	C ₆ H ₁₀ O ₄	Adipic acid HO ₂ C(CH ₂) ₄ CO ₂ H	146.08	151	265 ¹⁰⁰		
1563	C ₆ H ₁₀ O ₄	1, 1-Dimethylsuccinic acid	146.08	142	165 d.		
1564	C ₆ H ₁₀ O ₄	Ethylsuccinic acid	146.08	98			
1565	C ₆ H ₁₀ O ₄	Methylethylmalonic acid	146.08	117.5			
1566	C ₆ H ₁₀ O ₄	Propylmalonic acid C ₃ H ₇ CH(CO ₂ H) ₂	146.08	96			
1567	C ₆ H ₁₀ O ₄	Isopropylmalonic acid	146.08	87			
1568	C ₆ H ₁₀ O ₄	Dimethyl succinate (CH ₃ CO ₂ CH ₃) ₂	146.08	19.5	192.8	1.121	942
1569	C ₆ H ₁₀ O ₄	Dimethyl isosuccinate	146.08		179	1.028 ²⁵	
1570	C ₆ H ₁₀ O ₄	Diethyl oxalate (CO ₂ C ₂ H ₅) ₂	146.08	-40.6	186.1	1.080	182
1571	C ₆ H ₁₀ O ₄	Glycol diacetate (CH ₃ OCOCH ₂) ₂	146.08	-31	190.5	1.104	216
1572	C ₆ H ₁₀ O ₄	Ethylidene diacetate	146.08		169	0.852	
1572.1	C ₆ H ₁₀ O ₄	Methyl <i>l</i> -1-acetoxypropionate	146.08		172	1.089	
1573	C ₆ H ₁₀ O ₄	Mannide	146.08		317		
1574	C ₆ H ₁₀ O ₄	Isomannide	146.08	87	274		
1575	C ₆ H ₁₀ O ₅	Lactic anhydride (CH ₃ CHOHCO) ₂	162.08	260 d.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1576	$C_6H_{10}O_4$	Dimethyl malate.....	162.08		242	1.233	391
1577	$C_6H_{10}O_4$	β -Glucosan.....	162.08	178			
1578	$(C_6H_{10}O_5)_x$	Glycogen.....	(162.08) _x	240			
1578.1	$(C_6H_{10}O_5)_x$	Starch.....	(162.08) _x	d.		1.50 ²¹	1164
1579	$C_6H_{10}O_4$	<i>d</i> -Saccharine.....	162.08	161			
1580	$C_6H_{10}O_4$	Dimethyl <i>dl</i> -tartrate $(CH(OH)CO_2CH_3)_2$	178.08	85	282		
1581	$C_6H_{10}O_4$	Dimethyl <i>d</i> -tartrate.....	178.08	48; 61.5	280	1.328	
1582	$C_6H_{10}O_4$	Ethyl <i>d</i> -tartrate.....	178.08	90			
1583	$C_6H_{10}O_4$	Allomucic acid.....	210.08	171 d.			
1584	$C_6H_{10}O_4$	Mucic acid $HO_2C(CHOH)_4CO_2H$	210.08	206 d.			
1585	$C_6H_{10}O_4$	<i>d</i> (<i>l</i>)-Talomucic acid.....	210.08	158 d.			
1586	$C_6H_{10}O_4$	Isosaccharic acid.....	210.08	185			
1587	$C_6H_{10}S$	Diallyl sulfide $(CH_2:CHCH_2)_2S$	114.14	-83.0	138.7	0.888 ^{26,8}	1034
1588	$C_6H_{11}Br$	Cyclohexyl bromide.....	163.00		165.5	1.333	575
1589	$C_6H_{11}BrN_2O_2$	Bromural.....	223.02	154			
1590	$C_6H_{11}BrO_2$	1-Bromocaproic acid $C_6H_5CHBrCO_2H$	195.00		131 ¹⁰		
1591	$C_6H_{11}BrO_2$	2-Bromocaproic acid.....	195.00	35			
1592	$C_6H_{11}BrO_2$	Ethyl 1-bromobutyrate.....	195.00		179 d.	1.325 ²⁵	
1593	$C_6H_{11}BrO_2$	Ethyl 1-bromoisobutyrate.....	195.00		164 d.	1.315 ²⁵	
1595	$C_6H_{11}Cl$	Cyclohexyl chloride.....	118.54		142.5	0.973	451
1596	$C_6H_{11}ClO$	<i>n</i> -Caproyl chloride $C_6H_{11}COCl$	134.54		153		543
1597	$C_6H_{11}ClO_2$	Isoamyl chloroformate.....	150.54		156	1.024 ²⁵	
1598	$C_6H_{11}Cl_2N_2O_2$	Histidine dihydrochloride.....	228.03	235 d.			
1599	$C_6H_{11}Cl_2O_2$	Trichloroacetal $Cl_3CCH(OC_2H_5)_2$	221.46		197	1.266 ¹⁴	
1600	$C_6H_{11}Cl_2O_2$	Trichloroacetal (solid).....	221.46	83	230 d.		
1601	$C_6H_{11}I$	Cyclohexyl iodide.....	210.02		192	1.626	
1602	$C_6H_{11}N$	Capronitrile $C_6H_{11}CN$	97.09		163	0.809	188
1603	$C_6H_{11}N$	Isocapronitrile $(CH_3)_2CH(CH_2)_3CN$	97.09	-51.1	155.5	0.806	159
1604	$C_6H_{11}N$	Isocaproisonitrile $(CH_3)_2CH(CH_2)_3NC$	97.09		137		
1605	$C_6H_{11}NO_2$	Hygic acid.....	129.09	169			
1606	$C_6H_{11}NO_2$	Nitrocyclohexane.....	129.09	-34	205.5	1.068	
1607	$C_6H_{11}NO_2$	Adipyl amide $HO_2C(CH_2)_4CONH_2$	145.09	130			
1608	$C_6H_{11}NS$	Isoamyl isothiocyanate.....	129.16		182		
1609	$C_6H_{11}N_2O_4$	Citramide $(H_2NOCCH_2)_2C(OH)CONH_2$	189.11	215			
1610	C_6H_{12}	Butylethylene $C_4H_9CH:CH_2$	84.092	-98.5	64.1	0.683	44
1611	C_6H_{12}	2, 2-Dimethyl-4-butene.....	84.092		42.3		
1612	C_6H_{12}	Cyclohexane.....	84.092	6.5	81.4	0.779	304
1613	C_6H_{12}	2-Methyl-2-pentene $(CH_3)_2C:CHC_2H_5$	84.092		67.1	0.692	881
1615	C_6H_{12}	Methylcyclopentane.....	84.092	-140.5	73	0.750	
1616	C_6H_{12}	3-Methyl-2-pentene (isomer 1).....	84.092		65.7	0.722 ¹⁴	848
1617	C_6H_{12}	3-Methyl-2-pentene (isomer 2).....	84.092		70.2	0.698	128
1618	C_6H_{12}	2, 3-Dimethyl-1-butene.....	84.092		59	0.680 ⁰	
1619	C_6H_{12}	Tetramethylethylene.....	84.092		73	0.712	199
1620	$C_6H_{12}As_2$	Cacodyl carbide.....	234.01		84.5 ¹⁸		
1621	$C_6H_{12}As_2BiO_4$	Bismuth cacodylate $(8H_2O)$	613.97	82			
1622	$C_6H_{12}Cl_2O_2$	Dichloroacetal $Cl_2CHCH(OC_2H_5)_2$	187.01		184	1.138 ¹⁴	
1623	$C_6H_{12}N_2O_2$	Adipic diamide $H_2NOC(CH_2)_4CONH_2$	144.11	220			
1624	$C_6H_{12}N_2O_2$	<i>sym</i> -Diethyloxamide.....	144.11	190			
1625	$C_6H_{12}N_2O_4S_2$	<i>l</i> -Cystine.....	240.24	258 d.			1187
1626	$C_6H_{12}N_4$	Hexamethylenetetramine.....	140.12		263		
1627	$C_6H_{12}O$	Cyclohexanol.....	100.09	23.9	161.5	0.962	1051
1628	$C_6H_{12}O$	2-Hexene-4-ol.....	100.09		59 ²⁷	0.837	1008
1629	$C_6H_{12}O$	Dimethyl propenyl carbinol.....	100.09		112	0.835	321
1630	$C_6H_{12}O$	Pinacolin $(CH_3)_2CCOCH_3$	100.09	-52.5	106.2	0.811	
1631	$C_6H_{12}O$	Ethyl isocrotonyl ether.....	100.09		94		
1632	$C_6H_{12}O$	Isopropyl allyl ether.....	100.09		84.2	0.776	
1633	$C_6H_{12}O$	<i>n</i> -Caproic aldehyde $C_6H_{11}CHO$	100.09		129	0.834	
1634	$C_6H_{12}O$	Isobutylacetaldehyde.....	100.09		121.7		
1635	$C_6H_{12}O$	Methylpropylacetaldehyde.....	100.09		121		
1636	$C_6H_{12}O$	Ethyl propyl ketone $C_2H_5COC_2H_5$	100.09		124	0.818 ^{17,8}	124
1637	$C_6H_{12}O$	Ethyl isopropyl ketone.....	100.09		114.5	0.830 ⁰	
1638	$C_6H_{12}O$	Methyl <i>n</i> -butyl ketone $CH_3COC_4H_9$	100.09	-56.9	127.2	0.830 ⁰	
1639	$C_6H_{12}O$	Methyl isobutyl ketone.....	100.09	-84.7	119	0.803	96

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1640	C ₆ H ₁₂ O	Methyl <i>sec</i> -butyl ketone.....	100.09		117.8	0.815	115
1641	C ₆ H ₁₂ O ₂	Diacetone alcohol.....	116.09		166	0.931 ²⁴	
1642	C ₆ H ₁₂ O ₂	<i>tert</i> -Butylacetic acid.....	116.09	-11	190		
1643	C ₆ H ₁₂ O ₂	Caproic acid C ₆ H ₁₁ CO ₂ H.....	116.09	-9.5	202	0.929	207
1644	C ₆ H ₁₂ O ₂	Isocaproic acid.....	116.09	-35	207.7	0.925	217
1645	C ₆ H ₁₂ O ₂	Diethylacetic acid (C ₂ H ₅) ₂ CHCO ₂ H....	116.09	< -15	197	0.933 ^{10,2}	201
1646	C ₆ H ₁₂ O ₂	Dimethylethylacetic acid.....	116.09	-14	187		
1647	C ₆ H ₁₂ O ₂	Methylpropylacetic acid.....	116.09		193.5	0.928	
1648	C ₆ H ₁₂ O ₂	<i>n</i> -Amyl formate HCO ₂ C ₅ H ₁₁	116.09		130.4	0.902 ⁹	
1649	C ₆ H ₁₂ O ₂	Isoamyl formate.....	116.09		123.5	0.871	83
1650	C ₆ H ₁₂ O ₂	<i>tert</i> -Amyl formate.....	116.09		113	0.896 ¹⁵	
1651	C ₆ H ₁₂ O ₂	<i>n</i> -Butyl acetate CH ₃ CO ₂ C ₄ H ₉	116.09	-76.8	126.5	0.882	95
1652	C ₆ H ₁₂ O ₂	Isobutyl acetate CH ₃ CO ₂ CH ₂ CH(CH ₃) ₂	116.09	-98.9	118.3	0.871	118
1653	C ₆ H ₁₂ O ₂	<i>sec</i> -Butyl acetate.....	116.09		112.2	0.870	73
1654	C ₆ H ₁₂ O ₂	Ethyl <i>n</i> -butyrate C ₂ H ₅ CO ₂ C ₄ H ₉	116.09	-93.3	121.3	0.879	91
1655	C ₆ H ₁₂ O ₂	Ethyl isobutyrate.....	116.09	-88.2	111.7	0.871	80
1656	C ₆ H ₁₂ O ₂	Methyl trimethylacetate.....	116.09		102	1.044 ⁹	
1657	C ₆ H ₁₂ O ₂	Methyl <i>n</i> -valerate C ₄ H ₉ CO ₂ CH ₃	116.09		127.3	0.910 ⁹	
1658	C ₆ H ₁₂ O ₂	Methyl isovalerate.....	116.09		116.7	0.881	
1659	C ₆ H ₁₂ O ₂	<i>n</i> -Propyl propionate C ₃ H ₇ CO ₂ C ₃ H ₇	116.09	-75.9	123.4	0.883	92
1660	C ₆ H ₁₂ O ₂	Isopropyl propionate.....	116.09		111.3	0.893 ⁹	
1661	C ₆ H ₁₂ O ₃	Phloroglucite.....	132.09	185			
1662	C ₆ H ₁₂ O ₃	Paraldehyde (CH ₂ CHO) ₃	132.09	10.5	124	0.994	244
1663	C ₆ H ₁₂ O ₃	1-Hydroxy- <i>n</i> -caproic acid.....	132.09	62			
1664	C ₆ H ₁₂ O ₃	1-Hydroxyisocaproic acid.....	132.09	81			
1665	C ₆ H ₁₂ O ₃	<i>dl</i> -1-Hydroxyisocaproic acid.....	132.09	76			
1666	C ₆ H ₁₂ O ₃	1-Hydroxy-1, 1-diethylacetic acid.....	132.09	74.5			
1667	C ₆ H ₁₂ O ₃	Methyl <i>n</i> -butyl carbonate.....	132.09		151		
1668	C ₆ H ₁₂ O ₄	Fucose.....	164.09	145			
1669	C ₆ H ₁₂ O ₄	Mannitan.....	164.09	137			
1670	C ₆ H ₁₂ O ₄	<i>d</i> -Quercitol.....	164.09	234		1.585 ¹⁹	
1671	C ₆ H ₁₂ O ₄	<i>l</i> -Quercitol.....	164.09	174			
1672	C ₆ H ₁₂ O ₄ (H ₂ O)	β -Rhamnose.....	164.09	126		1.471	1219
1673	C ₆ H ₁₂ O ₄	Rhodoose.....	164.09	144			
1674	C ₆ H ₁₂ O ₄	<i>d</i> -Fructose (Levulose).....	180.09	104		1.669 ^{17,5}	
1675	C ₆ H ₁₂ O ₄	<i>d</i> , α -Galactose.....	180.09	168			
1675.1	C ₆ H ₁₂ O ₄	<i>d</i> , β -Galactose.....	180.09	168			
1676	C ₆ H ₁₂ O ₄	<i>dl</i> -Galactose.....	180.09	144			
1677	C ₆ H ₁₂ O ₄	<i>d</i> , α -Glucose.....	180.09	146		1.544 ²⁵	
1678	C ₆ H ₁₂ O ₄	<i>d</i> , β -Glucose.....	180.09	150			
1679	C ₆ H ₁₂ O ₄	<i>d</i> (<i>l</i>)-Inositol.....	180.09	247	250 vac.		
1680	C ₆ H ₁₂ O ₄	Dambose.....	180.09	224	d.	1.752	
1681	C ₆ H ₁₂ O ₄	α -Mannose.....	180.09	133	205 d.		
1682	C ₆ H ₁₂ O ₄	<i>d</i> -Mannose.....	180.09	132		1.539	
1683	C ₆ H ₁₂ O ₄	<i>dl</i> -Mannose.....	180.09	133			
1684	C ₆ H ₁₂ O ₄	<i>d</i> (<i>l</i>)-Sorbitose.....	180.09	154		1.612	
1685	C ₆ H ₁₂ O ₄	<i>dl</i> -Sorbitose.....	180.09	154		1.638	
1686	C ₆ H ₁₂ O ₄	<i>d</i> -Tagatose.....	180.09	124			
1687	C ₆ H ₁₂ S	Cyclohexyl mercaptan.....	116.16		160		
1688	C ₆ H ₁₂ S ₂	α -Trithioacetaldehyde.....	180.29	101	247		
1689	C ₆ H ₁₂ S ₂	β -Trithioacetaldehyde (C ₂ H ₄ S) ₃	180.29	126			
1690	C ₆ H ₁₂ S ₂	γ -Trithioacetaldehyde.....	180.29	81	100		
1690.1	C ₆ H ₁₂ Se	Hexamethyl selenide.....	163.29		172	1.122	
1691	C ₆ H ₁₂ Br	2-Bromo-2, 3-dimethylbutane.....	165.02	13	132		
1692	C ₆ H ₁₂ Br	<i>n</i> -Hexyl bromide C ₆ H ₁₁ CH ₂ Br.....	165.02		156	1.173	422
1693	C ₆ H ₁₂ BrO ₂	Bromoacetal BrCH ₂ CH(OC ₂ H ₅) ₂	197.02		170		
1694	C ₆ H ₁₂ Cl	2-Chloro-2, 3-dimethylbutane.....	120.56	-10.4	112.1	0.875 ²⁵	
1695	C ₆ H ₁₂ Cl	<i>n</i> -Hexyl chloride C ₆ H ₁₁ CH ₂ Cl.....	120.56		134	0.872	238
1696	C ₆ H ₁₂ ClN ₄ O ₄	Hexamethylenetetramine perchlorate....	240.59	158			
1697	C ₆ H ₁₂ I	<i>n</i> -Hexyl iodide C ₆ H ₁₁ CH ₂ I.....	212.03		180	1.441	560
1698	C ₆ H ₁₂ IO ₂	Iodoacetal ICH ₂ CH(OC ₂ H ₅) ₂	244.03		132 ⁹⁰	1.494 ¹⁵	
1699	C ₆ H ₁₂ N	1-Methylpiperidine.....	99.108		107	0.818	416
1700	C ₆ H ₁₂ N	2-Methylpiperidine (α -Pipicoline).....	99.108		119	0.844 ^{22,6}	1016

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1701	C ₈ H ₁₃ N	3-Methylpiperidine (β -Pipicoline).....	99.108		126	0.845 ^{24,3}	1020
1702	C ₈ H ₁₃ N	4-Methylpiperidine (γ -Pipicoline).....	99.108		129	0.867 ⁰	
1703	C ₈ H ₁₃ NO ₂	Hedonal H ₂ NCO ₂ CH(CH ₃)C ₂ H ₅	131.11	74	215		
1704	C ₈ H ₁₃ NO ₂	Isoamyl carbamate.....	131.11	63.5	220		
1704.1	C ₈ H ₁₃ NO ₂	Propyl urethane C ₂ H ₅ NHCO ₂ C ₂ H ₅	131.11		186	0.992 ¹⁵	
1705	C ₈ H ₁₃ NO ₂	<i>l</i> -Leucine (CH ₃) ₂ CHCH(NH ₂)CO ₂ H....	131.11	295		1.293	1221
1706	C ₈ H ₁₃ NO ₂	<i>dl</i> -Leucine.....	131.11	290			
1707	C ₈ H ₁₃ NO ₂	<i>d</i> (<i>l</i>)-Isoleucine.....	131.11	280 d.			
1708	C ₈ H ₁₃ NO ₂	<i>dl</i> -Isoleucine.....	131.11	275			
1709	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosamine.....	179.11	110 d.			
1710	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosimine.....	179.11	128			
1711	C ₈ H ₁₃ NO ₂	<i>d</i> -Glucosoxime.....	195.11	138			
1712	C ₈ H ₁₄	Diisopropyl (CH ₃) ₂ CHCH(CH ₃) ₂	86.108	-135.1	58.1	0.666 ¹⁶	38
1713	C ₈ H ₁₄	<i>n</i> -Hexane CH ₃ (CH ₂) ₄ CH ₃	86.108	-94.3	69.0	0.660	32
1714	C ₈ H ₁₄	3-Methylpentane (C ₂ H ₅) ₂ CHCH ₃	86.108		64	0.668	34
1715	C ₈ H ₁₄	2-Methylpentane (CH ₃) ₂ CHC ₂ H ₅	86.108		60.0	0.654	27
1716	C ₈ H ₁₄	2, 2-Dimethylbutane (CH ₃) ₂ CC ₂ H ₅	86.108	-98.2	49.7	0.649	23
1717	C ₈ H ₁₄ INO ₂	<i>d</i> -Glucosamine hydroiodide.....	307.05	165 d.			
1718	C ₈ H ₁₄ N ₂	α , 2, 5-Dimethylpiperazine.....	114.12	119	162		
1719	C ₈ H ₁₄ N ₂ O	Diacetoneamineoxime.....	130.12	53	135 ¹⁷		
1720	C ₈ H ₁₄ N ₂ O	Dipropylnitrosamine (C ₂ H ₅) ₂ NNO.....	130.12		205		
1721	C ₈ H ₁₄ N ₂ O ₇	Ammonium citrate.....	226.12			1.483	
1722	C ₈ H ₁₄ N ₂ O ₂	Arginine.....	174.14	207.5 d.			
1723	C ₈ H ₁₄ O	<i>tert</i> -Amyl carbinol.....	102.11		135	0.844 ⁰	
1724	C ₈ H ₁₄ O	Isohexyl alcohol.....	102.11		165	0.840 ⁰	429
1725	C ₈ H ₁₄ O	Dimethylisopropyl carbinol.....	102.11	-14	122	0.823	
1726	C ₈ H ₁₄ O	Ethylpropyl carbinol.....	102.11		135	0.819	
1726.1	C ₈ H ₁₄ O	<i>l</i> (<i>d</i>)-Ethylpropyl carbinol.....	102.11		134 ²³	0.825 ^{12,5}	211
1727	C ₈ H ₁₄ O	Ethylisopropyl carbinol.....	102.11		128	0.824	
1728	C ₈ H ₁₄ O	<i>n</i> -Hexyl alcohol C ₆ H ₁₃ OH.....	102.11	-51.6	155.8	0.820	
1730	C ₈ H ₁₄ O	Methylbutyl carbinol.....	102.11		131.9	0.803 ²⁵	183
1730.1	C ₈ H ₁₄ O	<i>d</i> -Methylbutyl carbinol.....	102.11		138	0.815	205
1732	C ₈ H ₁₄ O	Methyl- <i>sec</i> .-butyl carbinol.....	102.11		134	0.831 ¹⁸	245
1733	C ₈ H ₁₄ O	Pinacolyl alcohol (CH ₃) ₂ CH(OH)CH ₃ ..	102.11	5.5	121	0.812 ²⁶	
1733.1	C ₈ H ₁₄ O	<i>d</i> -Pinacolyl alcohol.....	102.11		120	0.820	214
1734	C ₈ H ₁₄ O	Methyldiethyl carbinol.....	102.11	-22	122.6	0.824	242
1735	C ₈ H ₁₄ O	3-Methyl-3-ethylpropyl alcohol.....	102.11		152.1	0.830 ¹⁵	
1736	C ₈ H ₁₄ O	2-Methyl-2-propylethyl alcohol.....	102.11		147.9	0.829	231
1737	C ₈ H ₁₄ O	Ethyl <i>n</i> -butyl ether C ₄ H ₉ OC ₂ H ₅	102.11		91.4	0.752	
1738	C ₈ H ₁₄ O	Ethyl isobutyl ether.....	102.11		80	0.751	
1739	C ₈ H ₁₄ O	Methyl <i>n</i> -amyl ether C ₅ H ₁₁ OCH ₃	102.11		88.5	0.754	53
1740	C ₈ H ₁₄ O	Methyl isoamyl ether.....	102.11		91	0.687 ⁹¹	
1741	C ₈ H ₁₄ O	Propyl ether (C ₂ H ₅) ₂ O.....	102.11	-122.0	89	0.747	41
1742	C ₈ H ₁₄ O	Isopropyl ether [(CH ₃) ₂ CH] ₂ O.....	102.11		68.7	0.735 ^{16,3}	
1743	C ₈ H ₁₄ O ₂	Pinacone [(CH ₃) ₂ COH] ₂	118.11	38	172.8		
1744	C ₈ H ₁₄ O ₂	Hexane-1, 5-diol.....	118.11		233	0.981 ⁰	
1745	C ₈ H ₁₄ O ₂	Hexane-1, 6-diol HOCH ₂ (CH ₂) ₄ CH ₂ OH	118.11	42	250		
1746	C ₈ H ₁₄ O ₂	Acetal CH ₃ CH(OC ₂ H ₅) ₂	118.11		102.2	0.831	42
1747	C ₈ H ₁₄ O ₃	Diglycerol [(HO) ₂ C ₂ H ₅] ₂ O.....	166.11		230 ¹⁰		
1748	C ₈ H ₁₄ O ₃	Fucitol.....	166.11	153			
1749	C ₈ H ₁₄ O ₃	Rhamnitol.....	166.11	121			
1750	C ₈ H ₁₄ O ₃	Dulcitol.....	182.11	188	295 ^{3,6}	1.466 ¹⁵	1333
1751	C ₈ H ₁₄ O ₃	<i>d</i> -Mannitol.....	182.11	166.1	295 ^{3,6}	1.489	1333
1752	C ₈ H ₁₄ O ₃	<i>d</i> -Sorbitol.....	182.11	110			1333
1753	C ₈ H ₁₄ O ₃	<i>d</i> -Talitol.....	182.11	86			
1754	C ₈ H ₁₄ S	Dipropyl sulfide (C ₂ H ₅) ₂ S.....	118.17		142	0.814	
1755	C ₈ H ₁₄ S	Diisopropyl sulfide [(CH ₃) ₂ CH] ₂ S.....	118.17		120.4		
1756	C ₈ H ₁₄ As	Triethyl arsine (C ₂ H ₅) ₃ As.....	162.08		141 d.	1.150	495
1757	C ₈ H ₁₄ AsO ₂	Triethyl arsenite (C ₂ H ₅ O) ₃ As.....	210.08		166	1.224 ⁰	
1758	C ₈ H ₁₄ AsO ₄	Triethyl arsenate (C ₂ H ₅ O) ₃ AsO.....	226.08		238	1.326 ⁰	
1759	C ₈ H ₁₄ Bi	Triethyl bismuthine (C ₂ H ₅) ₃ Bi.....	296.12		107 ⁷⁹	1.82	
1760	C ₈ H ₁₄ N	Di- <i>n</i> -propylamine (C ₂ H ₅) ₂ NH.....	101.12	-39.6	110.7	0.738	149
1761	C ₈ H ₁₄ N	Diisopropylamine [(CH ₃) ₂ CH] ₂ NH.....	101.12		84	0.722 ²²	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1762	C ₆ H ₁₁ N	<i>n</i> -Hexylamine C ₆ H ₁₁ NH ₂	101.12		128		
1762.1	C ₆ H ₁₁ N	2-Hexylamine C ₆ H ₉ CH(NH ₂)CH ₃	101.12	-19	130 ⁷⁴	0.767 ^{10.4}	
1763	C ₆ H ₁₁ N	Isohexylamine (CH ₃) ₂ CH(CH ₂) ₃ NH ₂ ...	101.12	-94.4	123.9		
1764	C ₆ H ₁₁ N	Triethylamine (C ₂ H ₅) ₃ N.....	101.12	-114.8	89.5	0.728	129
1765	C ₆ H ₁₁ NO ₂	Aminoacetal H ₂ NCH ₂ CH(OC ₂ H ₅) ₂	133.12		163		
1766	C ₆ H ₁₁ N ₂	Acetaldehydeammonia (trimeric).....	129.14	85			
1767	C ₆ H ₁₁ O ₃ P	Triethyl phosphite (C ₂ H ₅ O) ₃ P.....	166.14		156.5	1.076 ^{13.4}	169
1768	C ₆ H ₁₁ O ₄ P	Triethyl phosphate (C ₂ H ₅ O) ₃ PO.....	182.14		216	1.072 ¹²	150
1769	C ₆ H ₁₁ P	Triethylphosphine (C ₂ H ₅) ₃ P.....	118.14		128	0.800	413
1769.1	C ₆ H ₁₁ PS	Triethyl phosphinesulfide.....	150.20	94			1182
1770	C ₆ H ₁₁ Sb	Triethyl stibine (C ₂ H ₅) ₃ Sb.....	208.89		159.5	1.324 ¹⁶	
1771	C ₆ H ₁₁ ClN	Triethylamine hydrochloride.....	137.59	254		1.069	
1772	C ₆ H ₁₁ N ₂	Hexamethylenediamine H ₂ N(CH ₂) ₆ NH ₂	116.14	39	196		
1773	C ₆ H ₁₁ N ₂ O ₈ S	1, 1-Dimethylguanidine sulfate.....	270.25	288 d.			
1775	C ₇ H ₅ Cl ₃ O ₂	Pentachlorobenzoic acid C ₆ Cl ₅ CO ₂ H...	294.30	201			
1776	C ₇ H ₃ Br ₄ O ₂	2, 3, 4, 6-Tetrabromobenzoic acid.....	437.68	174			
1777	C ₇ H ₃ Cl ₄ O ₂	2, 3, 4, 5-Tetrachlorobenzoic acid.....	259.85	186			
1778	C ₇ H ₃ Br ₃ O ₂	2, 3, 4-Tribromobenzoic acid.....	358.77	198			
1779	C ₇ H ₃ Br ₂ O ₂	2, 3, 5-Tribromobenzoic acid.....	358.77	194			
1780	C ₇ H ₃ Br ₂ O ₂	2, 4, 5-Tribromobenzoic acid.....	358.77	196			
1781	C ₇ H ₃ Br ₂ O ₂	2, 4, 6-Tribromobenzoic acid.....	358.77	187			
1782	C ₇ H ₃ Br ₂ O ₂	3, 4, 5-Tribromobenzoic acid.....	358.77	235			
1783	C ₇ H ₃ Cl ₃ O ₂	2, 3, 4-Trichlorobenzoic acid.....	225.40	129			
1784	C ₇ H ₃ Cl ₃ O ₂	2, 3, 5-Trichlorobenzoic acid.....	225.40	163			
1785	C ₇ H ₃ Cl ₃ O ₂	2, 4, 5-Trichlorobenzoic acid.....	225.40	163			
1786	C ₇ H ₃ Cl ₃ O ₂	2, 4, 6-Trichlorobenzoic acid.....	225.40	160			
1787	C ₇ H ₃ Cl ₃ O ₂	3, 4, 5-Trichlorobenzoic acid.....	225.40	203			
1788	C ₇ H ₃ N ₃ O ₇	2, 4, 6-Trinitrobenzaldehyde.....	241.05	119			
1789	C ₇ H ₃ N ₃ O ₈	2, 4, 6-Trinitrobenzoic acid.....	257.05	190			
1790	C ₇ H ₄ BrClO	<i>o</i> -Bromobenzoyl chloride.....	219.41		243		
1791	C ₇ H ₄ BrClO	<i>m</i> -Bromobenzoyl chloride.....	219.41		239		
1792	C ₇ H ₄ BrClO	<i>p</i> -Bromobenzoyl chloride.....	219.41	42	247 s. d.		
1793	C ₇ H ₄ BrN	<i>o</i> -Bromobenzonitrile.....	181.96	51	253		
1794	C ₇ H ₄ BrN	<i>m</i> -Bromobenzonitrile.....	181.96	38	225		
1795	C ₇ H ₄ BrN	<i>p</i> -Bromobenzonitrile.....	181.96	113	237		
1796	C ₇ H ₄ Br ₂ O ₂	2, 3-Dibromobenzoic acid.....	279.86	150			
1797	C ₇ H ₄ Br ₂ O ₂	2, 4-Dibromobenzoic acid.....	279.86	169			
1798	C ₇ H ₄ Br ₂ O ₂	2, 5-Dibromobenzoic acid.....	279.86	153			
1799	C ₇ H ₄ Br ₂ O ₂	2, 6-Dibromobenzoic acid.....	279.86	147			
1800	C ₇ H ₄ Br ₂ O ₂	3, 4-Dibromobenzoic acid.....	279.86	230			
1801	C ₇ H ₄ Br ₂ O ₂	3, 5-Dibromobenzoic acid.....	279.86	214			
1802	C ₇ H ₄ Br ₂ O ₄	2, 6-Dibromo-3, 4, 5-trihydroxybenzoic acid.....	327.86	150			
1803	C ₇ H ₄ ClFO	<i>o</i> -Fluorobenzoyl chloride.....	158.49		206		
1804	C ₇ H ₄ ClFO	<i>m</i> -Fluorobenzoyl chloride.....	158.49		189		
1805	C ₇ H ₄ ClFO	<i>p</i> -Fluorobenzoyl chloride <i>p</i> -FC ₆ H ₄ COCl	158.49		193		
1806	C ₇ H ₄ ClNO ₂	<i>o</i> -Nitrobenzoyl chloride.....	185.50	75	205 ¹⁰⁶		
1807	C ₇ H ₄ ClNO ₂	<i>m</i> -Nitrobenzoyl chloride.....	185.50	34	278		
1808	C ₇ H ₄ ClNO ₂	<i>p</i> -Nitrobenzoyl chloride.....	185.50	72	154 ¹⁶		
1809	C ₇ H ₄ Cl ₂ O	2, 4-Dichlorobenzaldehyde.....	174.95	71			
1810	C ₇ H ₄ Cl ₂ O	2, 5-Dichlorobenzaldehyde.....	174.95	58	233	1.231 ⁷⁰	
1811	C ₇ H ₄ Cl ₂ O	3, 4-Dichlorobenzaldehyde.....	174.95	44	248		
1812	C ₇ H ₄ Cl ₂ O	<i>o</i> -Chlorobenzoyl chloride.....	174.95	-4	238		
1813	C ₇ H ₄ Cl ₂ O	<i>m</i> -Chlorobenzoyl chloride.....	174.95		117.5 ²⁶		
1814	C ₇ H ₄ Cl ₂ O	<i>p</i> -Chlorobenzoyl chloride.....	174.95		119 ^{27.5}		
1815	C ₇ H ₄ Cl ₃ O ₂	2, 3-Dichlorobenzoic acid.....	190.95	166			
1816	C ₇ H ₄ Cl ₃ O ₂	2, 4-Dichlorobenzoic acid.....	190.95	164.2			
1817	C ₇ H ₄ Cl ₃ O ₂	2, 5-Dichlorobenzoic acid.....	190.95	154.4	301		
1818	C ₇ H ₄ Cl ₃ O ₂	2, 6-Dichlorobenzoic acid.....	190.95	143.7			
1819	C ₇ H ₄ Cl ₃ O ₂	3, 4-Dichlorobenzoic acid.....	190.95	204.1			
1820	C ₇ H ₄ Cl ₃ O ₂	3, 5-Dichlorobenzoic acid.....	190.95	188.1			
1821	C ₇ H ₄ Cl ₃ NO ₂	2, 3, 4-Trichloronitrotoluene.....	240.41	60			
1822	C ₇ H ₄ Cl ₄	2-Chloro-1-trichloromethylbenzene.....	229.86	30	260	1.51	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1823	C ₇ H ₄ FNO ₄	2-Fluoro-5-nitrobenzoic acid.....	185.04	139			
1824	C ₇ H ₄ FNO ₄	3-Fluoro-4-nitrobenzoic acid.....	185.04	122			
1825	C ₇ H ₄ FNO ₄	3-Fluoro-6-nitrobenzoic acid.....	185.04	134.5			
1826	C ₇ H ₄ FNO ₄	4-Fluoro-2-nitrobenzoic acid.....	185.04	130			
1827	C ₇ H ₄ FNO ₄	4-Fluoro-3-nitrobenzoic acid.....	185.04	121.5			
1828	C ₇ H ₄ I ₂ O ₃	3, 5-Diiodosalicylic acid.....	389.90	230 d.			
1829	C ₇ H ₄ N ₂ O ₂	<i>o</i> -Nitrobenzonitrile.....	148.05	109			
1830	C ₇ H ₄ N ₂ O ₂	<i>m</i> -Nitrobenzonitrile.....	148.05	118			
1831	C ₇ H ₄ N ₂ O ₂	<i>p</i> -Nitrobenzonitrile.....	148.05	147			
1832	C ₇ H ₄ N ₂ O ₃	2, 4-Dinitrobenzaldehyde.....	196.05	72			
1833	C ₇ H ₄ N ₂ O ₃	2, 6-Dinitrobenzaldehyde.....	196.05	123			
1834	C ₇ H ₄ N ₂ O ₃	2, 3-Dinitrobenzoic acid.....	212.05	201			
1835	C ₇ H ₄ N ₂ O ₃	2, 4-Dinitrobenzoic acid.....	212.05	179			
1836	C ₇ H ₄ N ₂ O ₃	2, 5-Dinitrobenzoic acid.....	212.05	177			
1837	C ₇ H ₄ N ₂ O ₃	2, 6-Dinitrobenzoic acid.....	212.05	202 d.			
1838	C ₇ H ₄ N ₂ O ₃	3, 4-Dinitrobenzoic acid.....	212.05	163			
1839	C ₇ H ₄ N ₂ O ₃	3, 5-Dinitrobenzoic acid.....	212.05	205			
1840	C ₇ H ₄ N ₂ O ₇	3, 5-Dinitro-2-hydroxybenzoic acid.....	228.05	174			
1841	C ₇ H ₄ N ₄ O ₂	2, 3, 5, 6-Tetranitroanisole.....	288.06	154; 112			
1842	C ₇ H ₄ O ₈ S	<i>o</i> -Sulfobenzoic anhydride.....	184.10	130			
1843	C ₇ H ₄ O ₇	Meconic acid.....	200.03		d.		1333
1844	C ₇ H ₅ BrO	Benzoyl bromide C ₆ H ₅ COBr.....	184.96	0	219	1.570	
1845	C ₇ H ₅ BrO ₂	<i>o</i> -Bromobenzoic acid.....	200.96	148			
1846	C ₇ H ₅ BrO ₂	<i>m</i> -Bromobenzoic acid.....	200.96	152			
1847	C ₇ H ₅ BrO ₂	<i>p</i> -Bromobenzoic acid.....	200.96	251			
1848	C ₇ H ₅ BrO ₂	3-Bromo-2-hydroxybenzoic acid.....	216.96	220			
1849	C ₇ H ₅ BrO ₂	5-Bromo-2-hydroxybenzoic acid.....	216.96	165			
1850	C ₇ H ₃ Br ₃	2, 3, 4-Tribromotoluene.....	328.79	45			
1851	C ₇ H ₃ Br ₃	2, 3, 5-Tribromotoluene.....	328.79	54			
1852	C ₇ H ₃ Br ₃	2, 3, 6-Tribromotoluene.....	328.79	59			
1853	C ₇ H ₃ Br ₃	2, 4, 5-Tribromotoluene.....	328.79	113			
1854	C ₇ H ₃ Br ₃	2, 4, 6-Tribromotoluene.....	328.79	66			
1855	C ₇ H ₃ Br ₃	3, 4, 5-Tribromotoluene.....	328.79	89			
1856	C ₇ H ₅ ClO	<i>o</i> -Chlorobenzaldehyde.....	140.50	-3	205	1.252	753
1857	C ₇ H ₅ ClO	<i>m</i> -Chlorobenzaldehyde.....	140.50	18	204	1.241	751
1858	C ₇ H ₅ ClO	<i>p</i> -Chlorobenzaldehyde.....	140.50	47.5	214	1.196 ⁴¹	1092
1859	C ₇ H ₅ ClO	Benzoyl chloride C ₆ H ₅ COCl.....	140.50	-0.8	197.2	1.211	737
1860	C ₇ H ₅ ClO ₂	<i>o</i> -Chlorobenzoic acid.....	156.50	140.7			
1861	C ₇ H ₅ ClO ₂	<i>m</i> -Chlorobenzoic acid.....	156.50	154.9			
1862	C ₇ H ₅ ClO ₂	<i>p</i> -Chlorobenzoic acid.....	156.50	241.5			
1863	C ₇ H ₅ ClO ₂	Salicyl chloride <i>o</i> -HOC ₆ H ₄ COCl.....	156.50	18.0	59 ^{1.0} s. d.		
1864	C ₇ H ₅ ClO ₂	5-Chloro-2-hydroxybenzoic acid.....	172.50	167.5			
1865	C ₇ H ₅ Cl ₂ NO ₂	<i>m</i> -Nitrobenzal chloride.....	205.96	65			
1866	C ₇ H ₅ Cl ₂ NO ₂ S	Halazone.....	270.03	213			
1868	C ₇ H ₅ Cl ₂	<i>o</i> -Chlorobenzal chloride.....	195.41		228.5	1.399 ¹⁵	
1869	C ₇ H ₅ Cl ₂	<i>p</i> -Chlorobenzal chloride.....	195.41		234		
1870	C ₇ H ₅ Cl ₃	Benzotrichloride C ₆ H ₅ CCl ₃	195.41	-4.8	220.7	1.378 ¹⁵	
1871	C ₇ H ₅ Cl ₃	2, 3, 4-Trichlorotoluene.....	195.41	41	234		
1872	C ₇ H ₅ Cl ₃	2, 4, 5-Trichlorotoluene.....	195.41	82	232		
1873	C ₇ H ₅ Cl ₃	3, 4, 5-Trichlorotoluene.....	195.41	42.5	247		
1874	C ₇ H ₅ Cl ₃ O	2, 4, 6-Trichloro-3-hydroxytoluene.....	211.41	46			
1875	C ₇ H ₅ Cl ₃ O	2, 4, 6-Trichloroanisole.....	211.41	60.5	240.7		
1876	C ₇ H ₅ FO	Benzoyl fluoride C ₆ H ₅ COF.....	124.04		162		
1877	C ₇ H ₅ FO ₂	<i>o</i> -Fluorobenzoic acid.....	140.04	122			
1878	C ₇ H ₅ FO ₂	<i>m</i> -Fluorobenzoic acid.....	140.04	124			
1879	C ₇ H ₅ FO ₂	<i>p</i> -Fluorobenzoic acid.....	140.04	182			
1880	C ₇ H ₅ IO	Benzoyl iodide C ₆ H ₅ COI.....	231.97	3	135 ²⁵		
1881	C ₇ H ₅ IO ₂	<i>o</i> -Iodobenzoic acid.....	247.97	162			
1882	C ₇ H ₅ IO ₂	<i>m</i> -Iodobenzoic acid.....	247.97	185			
1883	C ₇ H ₅ IO ₂	<i>p</i> -Iodobenzoic acid.....	247.97	266			
1884	C ₇ H ₅ IO ₂	3-Iodo-2-hydroxybenzoic acid.....	263.97	198			
1885	C ₇ H ₅ N	Benzonitrile C ₆ H ₅ CN.....	103.05	-13.1	190.7	1.008 ^{10, 11}	1028
1886	C ₇ H ₅ N	Phenyl isocyanide C ₆ H ₅ NC.....	103.05		166 d.	0.978 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1887	C ₇ H ₈ NO	Anthranil.....	119.05	> -18	215	1.187 ₄ ¹⁵	768
1888	C ₇ H ₈ NO	Benzoxazol.....	119.05	30.5	182.5		
1889	C ₇ H ₈ NO	Phenyl isocyanate C ₆ H ₅ N:CO.....	119.05		165.6	1.095	
1890	C ₇ H ₈ NO	Salicylic nitrile o-OHC ₆ H ₄ CN.....	119.05	98			
1891	C ₇ H ₈ NOS	1-Hydroxybenzothiazole.....	151.11	136			
1892	C ₇ H ₈ NOS	1-Mercaptobenzoxazole.....	151.11	193			
1893	C ₇ H ₈ NO ₂	o-Nitrobenzaldehyde.....	151.05	α40.9; β37.9	156 ¹⁸		
1894	C ₇ H ₈ NO ₂	m-Nitrobenzaldehyde.....	151.05	58.0	164 ²²		
1895	C ₇ H ₈ NO ₂	p-Nitrobenzaldehyde.....	151.05	106.5			
1896	C ₇ H ₈ NO ₂ S	o-Benzoicsulfimide (Saccharin).....	183.11	228 d.			
1897	C ₇ H ₈ NO ₄	o-Nitrobenzoic acid.....	167.05	147.5		1.575 ⁴	
1898	C ₇ H ₈ NO ₄	m-Nitrobenzoic acid.....	167.05	141.4		1.494 ⁴	
1899	C ₇ H ₈ NO ₄	p-Nitrobenzoic acid.....	167.05	242.4		1.550 ₄ ²²	
1900	C ₇ H ₈ NO ₄	Quinolinic acid.....	167.05	190 d.			
1901	C ₇ H ₈ NO ₄	Lutidinic acid.....	167.05	248			
1902	C ₇ H ₈ NO ₄	Isocinchomeric acid.....	167.05	237			
1903	C ₇ H ₈ NO ₄	Dipicolinic acid.....	167.05	226 d.			
1904	C ₇ H ₈ NO ₄	Cinchomeric acid.....	167.05	258 d.			
1905	C ₇ H ₈ NO ₄	Dinicotinic acid.....	167.05	323			
1906	C ₇ H ₈ NO ₆	Ammonchelidonic acid.....	183.05	220 d.			
1907	C ₇ H ₈ NO ₆	3-Nitro-2-hydroxybenzoic acid.....	183.05	144			
1908	C ₇ H ₈ NO ₆	4-Nitro-2-hydroxybenzoic acid.....	183.05	235			
1909	C ₇ H ₈ NO ₆	5-Nitro-2-hydroxybenzoic acid.....	183.05	228			
1910	C ₇ H ₈ NO ₆	6-Nitro-2-hydroxybenzoic acid.....	183.05	130			
1911	C ₇ H ₈ NO ₆	2-Nitro-3-hydroxybenzoic acid.....	183.05	178			
1912	C ₇ H ₈ NO ₆	4-Nitro-3-hydroxybenzoic acid.....	183.05	230			
1913	C ₇ H ₈ NO ₆	5-Nitro-3-hydroxybenzoic acid.....	183.05	167			
1914	C ₇ H ₈ NO ₆	6-Nitro-3-hydroxybenzoic acid.....	183.05	169			
1915	C ₇ H ₈ NO ₆	3-Nitro-4-hydroxybenzoic acid.....	183.05	185			
1916	C ₇ H ₈ NS	Benzothiazol.....	135.11		230	1.248	798
1917	C ₇ H ₈ NS	Phenyl thiocyanate C ₆ H ₅ CNS.....	135.11		232	1.155	
1918	C ₇ H ₈ NS	Phenyl isothiocyanate C ₆ H ₅ N:CS.....	135.11	-21	218.5	1.135 ^{18, 22}	
1919	C ₇ H ₈ N ₂	1, 2, 3-Benzotriazin.....	131.06	75	240		
1920	C ₇ H ₈ N ₂ O ₆	Chrysanic acid.....	227.06	259			
1921	C ₇ H ₈ N ₂ O ₆	2, 3, 4-Trinitrotoluene.....	227.06	112	302 d.	1.620	
1922	C ₇ H ₈ N ₂ O ₆	2, 3, 5-Trinitrotoluene.....	227.06	97	335 d.		
1923	C ₇ H ₈ N ₂ O ₆	2, 3, 6-Trinitrotoluene.....	227.06	111	333 d.		
1924	C ₇ H ₈ N ₂ O ₆	2, 4, 6-Trinitrotoluene (T. N. T.).....	227.06	80.7	240 exp.	1.654	
1925	C ₇ H ₈ N ₂ O ₆	3, 4, 5-Trinitrotoluene.....	227.06	137.5	313 d.		
1926	C ₇ H ₈ N ₂ O ₆	3, 4, 6-Trinitrotoluene.....	227.06	104	291 d.	1.620	
1927	C ₇ H ₈ N ₂ O ₇	2, 3, 4-Trinitroanisol.....	243.06	155	exp.		
1928	C ₇ H ₈ N ₂ O ₇	2, 3, 5-Trinitroanisol.....	243.06	104		1.618 ¹⁸	
1929	C ₇ H ₈ N ₂ O ₇	2, 4, 6-Trinitroanisol.....	243.06	68.4		1.408	
1930	C ₇ H ₈ N ₂ O ₇	3, 4, 5-Trinitroanisol.....	243.06	120			
1931	C ₇ H ₈ N ₂ O ₇	3, 4, 6-Trinitroanisol.....	243.06	107			
1932	C ₇ H ₈ N ₂ O ₇	2, 4, 6-Trinitro-3-hydroxytoluene.....	243.06	106			
1933	C ₇ H ₈ N ₂ O ₈	2, 4, 6-Trinitrophenylmethylnitramine (Tetryl).....	287.08	130	exp. 187		
1934	C ₇ H ₈ BrCl	o-Bromobenzyl chloride.....	205.42		115 ¹⁸		716.1
1935	C ₇ H ₈ BrCl	p-Bromobenzyl chloride.....	205.42	51			
1936	C ₇ H ₈ BrCl	o-Chlorobenzyl bromide.....	205.42		120 ¹⁰		
1937	C ₇ H ₈ BrCl	p-Chlorobenzyl bromide.....	205.42	48			
1938	C ₇ H ₈ BrNO	o-Bromobenzamide.....	199.97	156			
1939	C ₇ H ₈ BrNO	m-Bromobenzamide.....	199.97	150			
1940	C ₇ H ₈ BrNO	p-Bromobenzamide.....	199.97	190			
1941	C ₇ H ₈ BrNO ₂	o-Nitrobenzyl bromide.....	215.97	46			
1942	C ₇ H ₈ BrNO ₂	m-Nitrobenzyl bromide.....	215.97	58			
1943	C ₇ H ₈ BrNO ₂	p-Nitrobenzyl bromide.....	215.97	100			
1944	C ₇ H ₈ Br ₂	Benzal bromide C ₆ H ₅ CHBr ₂	249.88		140 ²⁰	1.51 ¹⁸	
1945	C ₇ H ₈ Br ₂	o-Bromobenzyl bromide.....	249.88	30			
1946	C ₇ H ₈ Br ₂	m-Bromobenzyl bromide.....	249.88	41			
1947	C ₇ H ₈ Br ₂	p-Bromobenzyl bromide.....	249.88	61			
1948	C ₇ H ₈ Br ₂	2, 3-Dibromotoluene.....	249.88	31			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
1949	C ₇ H ₅ Br ₂	2, 6-Dibromotoluene.....	249.88	5.5	246	1.812 ²²	
1950	C ₇ H ₅ Br ₂	3, 5-Dibromotoluene.....	249.88	39			
1951	C ₇ H ₅ ClNO	<i>o</i> -Chlorobenzamide.....	155.51	141			
1952	C ₇ H ₅ ClNO	<i>m</i> -Chlorobenzamide.....	155.51	134.5			
1953	C ₇ H ₅ ClNO	<i>p</i> -Chlorobenzamide.....	155.51	178.3			
1954	C ₇ H ₅ ClNO ₂	3-Chloro-2-nitrotoluene.....	171.51	23			
1955	C ₇ H ₅ ClNO ₂	4-Chloro-2-nitrotoluene.....	171.51	38.2	242	1.256 ⁸⁰	
1956	C ₇ H ₅ ClNO ₂	5-Chloro-2-nitrotoluene.....	171.51	44	250		
1957	C ₇ H ₅ ClNO ₂	6-Chloro-2-nitrotoluene.....	171.51	37	238		
1958	C ₇ H ₅ ClNO ₂	2-Chloro-3-nitrotoluene.....	171.51	21.5	263		
1959	C ₇ H ₅ ClNO ₂	4-Chloro-3-nitrotoluene.....	171.51	7	260.5	1.297 ²²	
1960	C ₇ H ₅ ClNO ₂	5-Chloro-3-nitrotoluene.....	171.51	61			
1961	C ₇ H ₅ ClNO ₂	<i>o</i> -Nitrobenzyl chloride.....	171.51	49			1093
1962	C ₇ H ₅ ClNO ₂	<i>m</i> -Nitrobenzyl chloride.....	171.51	44.5	183 ²²		1094
1963	C ₇ H ₅ ClNO ₂	<i>p</i> -Nitrobenzyl chloride.....	171.51	71			1095
1964	C ₇ H ₅ Cl ₂	Benzal chloride C ₆ H ₅ CHCl ₂	160.96	-17.4	214	1.295 ¹⁶	
1965	C ₇ H ₅ Cl ₂	<i>o</i> -Chlorobenzyl chloride.....	160.96		214		
1966	C ₇ H ₅ Cl ₂	<i>p</i> -Chlorobenzyl chloride.....	160.96	29	214		
1967	C ₇ H ₅ Cl ₂ O	1, 1-Dichloro-2-hydroxytoluene.....	176.96	82			
1968	C ₇ H ₅ Cl ₂ O	3, 5-Dichloro-2-hydroxytoluene.....	176.96	55			
1969	C ₇ H ₅ Cl ₂ O	4, 6-Dichloro-3-hydroxytoluene.....	176.96	46			
1970	C ₇ H ₅ Cl ₂ O ₂	4, 5-Dichloro-2-methoxyphenol.....	192.96	72	270		
1971	C ₇ H ₅ FNO	<i>o</i> -Fluorobenzamide.....	139.05	116			
1972	C ₇ H ₅ FNO	<i>m</i> -Fluorobenzamide.....	139.05	130			
1973	C ₇ H ₅ FNO	<i>p</i> -Fluorobenzamide.....	139.05	154.5			
1974	C ₇ H ₅ I NO	<i>o</i> -Iodobenzamide.....	246.99	183.6			
1975	C ₇ H ₅ I NO	<i>m</i> -Iodobenzamide.....	246.99	186.5			
1976	C ₇ H ₅ I NO	<i>p</i> -Iodobenzamide.....	246.99	217.6			
1977	C ₇ H ₅ N ₂	Benzimidazol.....	118.06	170	<360		1270
1978	C ₇ H ₅ N ₂	Cyanilide CNNHC ₆ H ₅	118.06	47			
1979	C ₇ H ₅ N ₂	Indazole.....	118.06	146.5	270.6		
1980	C ₇ H ₅ N ₂ O ₂	Ricininic acid.....	150.06	298			
1981	C ₇ H ₅ N ₂ O ₂	<i>o</i> -Nitrobenzamide.....	166.06	176.6	317	1.462 ²²	
1982	C ₇ H ₅ N ₂ O ₂	<i>m</i> -Nitrobenzamide.....	166.06	142.7	315		
1983	C ₇ H ₅ N ₂ O ₂	<i>p</i> -Nitrobenzamide.....	166.06	201.4			
1984	C ₇ H ₅ N ₂ O ₄	2, 3-Dinitrotoluene.....	182.06	59.3		1.263 ¹¹¹	
1985	C ₇ H ₅ N ₂ O ₄	2, 4-Dinitrotoluene.....	182.06	69.6	300 s. d.	1.521 ¹⁴	1297
1986	C ₇ H ₅ N ₂ O ₄	2, 5-Dinitrotoluene.....	182.06	50.5		1.282 ¹¹¹	
1987	C ₇ H ₅ N ₂ O ₄	2, 6-Dinitrotoluene.....	182.06	61		1.283 ¹¹¹	1300
1988	C ₇ H ₅ N ₂ O ₄	3, 4-Dinitrotoluene.....	182.06	59.8		1.259 ¹¹¹	
1989	C ₇ H ₅ N ₂ O ₄	3, 5-Dinitrotoluene.....	182.06	93		1.277 ¹¹¹	
1990	C ₇ H ₅ N ₂ O ₅	2, 4-Dinitroanisol.....	198.06	95.2		1.341	
1991	C ₇ H ₅ N ₂ O ₅	2, 5-Dinitroanisol.....	198.06	97.0	360	1.476	
1992	C ₇ H ₅ N ₂ O ₅	2, 6-Dinitroanisol.....	198.06	117.5		1.319	
1993	C ₇ H ₅ N ₂ O ₅	3, 4-Dinitroanisol.....	198.06	69.3		1.334 ¹¹⁰	
1994	C ₇ H ₅ N ₂ O ₅	3, 5-Dinitroanisol.....	198.06	105.8		1.558 ¹²	
1995	C ₇ H ₅ N ₂ O ₅	2, 4-Dinitro-3-hydroxytoluene.....	198.06	99			
1996	C ₇ H ₅ N ₂ O ₅	3, 5-Dinitro-4-hydroxytoluene.....	198.06	85.8			
1997	C ₇ H ₅ N ₂ O ₅	4, 6-Dinitro-2-methoxyphenol.....	214.06	123			
1998	C ₇ H ₅ N ₂ O ₇ S	2, 6-Dinitrotoluene-4-sulfonic acid.....	262.13	165			
1999	C ₇ H ₅ N ₂ S	1-Aminobenzothiazole.....	150.13	127			
2000	C ₇ H ₅ N ₄ O ₇	2, 4, 6-Trinitro-3-aminoanisol.....	258.08	131			
2001	C ₇ H ₅ O	Benzaldehyde C ₆ H ₅ CHO.....	106.05	-56.0	179.5	1.046	725
2002	C ₇ H ₅ OS	Thiobenzoic acid C ₆ H ₅ COSH.....	138.11	24			
2003	C ₇ H ₅ O ₂	Furfuracrolein.....	122.05	51	200		
2004	C ₇ H ₅ O ₂	Salicyl aldehyde <i>o</i> -HOC ₆ H ₄ CHO.....	122.05	-7	196.5	1.167	759
2005	C ₇ H ₅ O ₂	<i>m</i> -Hydroxybenzaldehyde.....	122.05	106.0	240		
2006	C ₇ H ₅ O ₂	<i>p</i> -Hydroxybenzaldehyde.....	122.05	116.0		1.129 ¹²⁰	
2007	C ₇ H ₅ O ₂	Benzoic acid C ₆ H ₅ CO ₂ H.....	122.05	121.7	249.2	1.266 ¹⁵	1160, 1333
2008	C ₇ H ₅ O ₂	Phenyl formate HCO ₂ C ₆ H ₅	122.05		173	1.088	
2009	C ₇ H ₅ O ₂	Toluquinone CH ₃ C ₆ H ₄ O ₂	122.05	69			
2010	C ₇ H ₅ O ₂ S	Thiosalicylic acid <i>o</i> -SHC ₆ H ₄ CO ₂ H.....	154.11	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2011	C ₇ H ₆ O ₂	2, 3-Dihydroxybenzaldehyde.....	138.05	108	235		
2012	C ₇ H ₆ O ₂	3, 4-Dihydroxybenzaldehyde.....	138.05	154			
2013	C ₇ H ₆ O ₂	Salicylic acid <i>o</i> -HOC ₆ H ₄ CO ₂ H.....	138.05	159	s. 76	1.443	1333
2014	C ₇ H ₆ O ₂	<i>m</i> -Hydroxybenzoic acid.....	138.05	201.3		1.473 ⁴	
2015	C ₇ H ₆ O ₂	<i>p</i> -Hydroxybenzoic acid.....	138.05	213		1.468 ⁴	
2016	C ₇ H ₆ O ₄	2, 3-Dihydroxybenzoic acid.....	154.05	204			
2017	C ₇ H ₆ O ₄	2, 4-Dihydroxybenzoic acid.....	154.05	206			
2018	C ₇ H ₆ O ₄	2, 5-Dihydroxybenzoic acid.....	154.05	200			
2019	C ₇ H ₆ O ₄	2, 6-Dihydroxybenzoic acid.....	154.05	167 d.			
2020	C ₇ H ₆ O ₄	3, 4-Dihydroxybenzoic acid.....	154.05	199		1.542 ⁴	
2021	C ₇ H ₆ O ₄	3, 5-Dihydroxybenzoic acid.....	154.05	227			
2022	C ₇ H ₆ O ₄	Pyrogallolcarboxylic acid.....	170.05	200 d.			
2023	C ₇ H ₆ O ₄	Gallic acid 3, 4, 5-(HO) ₃ C ₆ H ₂ CO ₂ H....	170.05	220 d.	d.	1.694 ⁴	1333
2024	C ₇ H ₆ O ₂ S	<i>o</i> -Sulfobenzoic acid.....	202.11	141			
2025	C ₇ H ₆ O ₂ S	<i>m</i> -Sulfobenzoic acid HO ₂ SC ₆ H ₄ CO ₂ H....	202.11	141			
2026	C ₇ H ₆ O ₂ S	<i>p</i> -Sulfobenzoic acid HO ₂ SC ₆ H ₄ CO ₂ H....	202.11	200			
2027	C ₇ H ₆ O ₂ S	Salicylsulfonic acid.....	218.11	120			
2028	C ₇ H ₇ AsCl ₂	Benzyl arsine dichloride.....	236.93		175 ⁵⁰		
2029	C ₇ H ₇ Br	Benzyl bromide.....	170.97	-4.0	199	1.438 ²²	
2030	C ₇ H ₇ Br	<i>o</i> -Bromotoluene.....	170.97	-28.1	181.8	1.422	738
2031	C ₇ H ₇ Br	<i>m</i> -Bromotoluene.....	170.97	-39.8	183.7	1.410	734
2032	C ₇ H ₇ Br	<i>p</i> -Bromotoluene.....	170.97	28	183.6	1.310	732
2033	C ₇ H ₇ BrO	5-Bromo-2-hydroxytoluene.....	186.97	64	235		
2034	C ₇ H ₇ BrO	5-Bromo-3-hydroxytoluene.....	186.97	62			
2035	C ₇ H ₇ BrO	3-Bromo-4-hydroxytoluene.....	186.97		214	1.547 ^{24, 5}	
2036	C ₇ H ₇ BrO ₂	6-Bromo-2-methoxyphenol.....	202.97	63			
2037	C ₇ H ₇ BrO ₂	4-Bromo-2-methoxyphenol.....	202.97	46	182 ⁵⁰		
2038	C ₇ H ₇ Cl	Benzyl chloride.....	126.51	-39	179.4	1.103 ¹⁸	711
2039	C ₇ H ₇ Cl	<i>o</i> -Chlorotoluene.....	126.51	-35.1	159.4	1.080	691
2040	C ₇ H ₇ Cl	<i>m</i> -Chlorotoluene.....	126.51	-47.8	162.4	1.072	672
2041	C ₇ H ₇ Cl	<i>p</i> -Chlorotoluene.....	126.51	7.8	162.5	1.071 ¹⁸	666
2042	C ₇ H ₇ ClO	<i>o</i> -Chlorobenzyl alcohol.....	142.51	72	230		
2043	C ₇ H ₇ ClO	<i>m</i> -Chlorobenzyl alcohol.....	142.51		234		
2044	C ₇ H ₇ ClO	<i>p</i> -Chlorobenzyl alcohol.....	142.51	70.5	235		
2045	C ₇ H ₇ ClO	3-Chloro-2-hydroxytoluene.....	142.51	86	225		
2046	C ₇ H ₇ ClO	4-Chloro-2-hydroxytoluene.....	142.51	49	225		
2047	C ₇ H ₇ ClO	5-Chloro-2-hydroxytoluene.....	142.51	49	220		
2048	C ₇ H ₇ ClO	4-Chloro-3-hydroxytoluene.....	142.51	66	235		
2049	C ₇ H ₇ ClO	6-Chloro-3-hydroxytoluene.....	142.51	53	235		
2050	C ₇ H ₇ ClO	2-Chloro-4-hydroxytoluene.....	142.51		196	1.211 ²²	
2051	C ₇ H ₇ ClO	3-Chloro-4-hydroxytoluene.....	142.51	55	228		
2052	C ₇ H ₇ ClO ₂	4(5)-Chloro-2-methoxyphenol.....	158.51	< -18	241.5		
2053	C ₇ H ₇ ClO ₂ S	Toluene- <i>o</i> -sulfonechloride.....	190.58	10	126 ²¹	1.339	
2054	C ₇ H ₇ ClO ₂ S	Toluene- <i>p</i> -sulfonechloride.....	190.58	69	146 ¹⁸		
2055	C ₇ H ₇ ClO ₂ S	2-Chlorotoluene-5-sulfonic acid.....	206.58	78			
2056	C ₇ H ₇ Cl ₂ NO ₂ S	Toluene- <i>p</i> -sulfonedichloroamine.....	240.04	83			
2057	C ₇ H ₇ F	<i>o</i> -Fluorotoluene.....	110.05	< -80	114	1.001	505
2058	C ₇ H ₇ F	<i>m</i> -Fluorotoluene.....	110.05	-110.8	116	0.999	500
2059	C ₇ H ₇ F	<i>p</i> -Fluorotoluene.....	110.05		117	1.001 ^{18, 3}	502
2060	C ₇ H ₇ I	Benzyl iodide.....	217.99	24.1	d.	1.733 ²⁵	
2061	C ₇ H ₇ I	<i>o</i> -Iodotoluene.....	217.99		211	1.697	785
2062	C ₇ H ₇ I	<i>m</i> -Iodotoluene.....	217.99		204	1.698	
2063	C ₇ H ₇ I	<i>p</i> -Iodotoluene.....	217.99	35	211.5		
2064	C ₇ H ₇ IO	<i>o</i> -Iodoanisole <i>o</i> -CH ₃ OC ₆ H ₄ I.....	233.99		240	1.800	
2065	C ₇ H ₇ IO ₂	5-Iodo-2-methoxyphenol.....	249.99	88			
2066	C ₇ H ₇ IO ₂	4-Iodo-2-methoxyphenol.....	249.99	43	180 d.	1.5	
2067	C ₇ H ₇ NO	<i>o</i> -Aminobenzaldehyde.....	121.06	40			
2068	C ₇ H ₇ NO	<i>m</i> -Aminobenzaldehyde.....	121.06	71.5			
2069	C ₇ H ₇ NO	<i>p</i> -Aminobenzaldehyde.....	121.06	71			
2070	C ₇ H ₇ NO	<i>syn</i> -Benzaldoxime C ₆ H ₅ C:NOH.....	121.06	130			
2071	C ₇ H ₇ NO	<i>anti</i> -Benzaldoxime C ₆ H ₅ C:NOH.....	121.06	35	153 ⁵²	1.111	972
2072	C ₇ H ₇ NO	Benzamide C ₆ H ₅ CONH ₂	121.06	130	290	1.341 ⁴	
2073	C ₇ H ₇ NO	Formanilide HCONHC ₆ H ₅	121.06	47.5	271	1.112 ⁵⁰	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2074	C ₇ H ₇ NO ₂	Anthranilic acid <i>o</i> -H ₂ NC ₆ H ₄ CO ₂ H.....	137.06	145			
2075	C ₇ H ₇ NO ₂	<i>m</i> -Aminobenzoic acid.....	137.06	174		1.511 ⁴	
2076	C ₇ H ₇ NO ₂	<i>p</i> -Aminobenzoic acid.....	137.06	187			
2077	C ₇ H ₇ NO ₂	Benzohydroxamic acid.....	137.06	125			
2078	C ₇ H ₇ NO ₂	<i>o</i> -Hydroxybenzamide.....	137.06	140	270 d.		
2079	C ₇ H ₇ NO ₂	<i>m</i> -Hydroxybenzamide.....	137.06	170.5			
2080	C ₇ H ₇ NO ₂	<i>p</i> -Hydroxybenzamide.....	137.06	162			
2081	C ₇ H ₇ NO ₂	<i>o</i> -Nitrotoluene.....	137.06	α -10.6; β -4.1	222.3	1.168 ¹⁴	724
2082	C ₇ H ₇ NO ₂	<i>m</i> -Nitrotoluene.....	137.06	15.5	231	1.164 ¹⁴	729
2083	C ₇ H ₇ NO ₂	<i>p</i> -Nitrotoluene.....	137.06	51.3	238	1.098 ¹⁰	1096
2084	C ₇ H ₇ NO ₂	Phenylnitromethane.....	137.06		227	1.160	702
2085	C ₇ H ₇ NO ₂	<i>o</i> -Nitrobenzyl alcohol.....	153.06	74	168 ²⁰		
2086	C ₇ H ₇ NO ₂	<i>m</i> -Nitrobenzyl alcohol.....	153.06	27	180 ²		
2087	C ₇ H ₇ NO ₂	<i>p</i> -Nitrobenzyl alcohol.....	153.06	93	185 ¹²		
2088	C ₇ H ₇ NO ₂	3-Nitro- <i>o</i> -cresol.....	153.06	145			
2089	C ₇ H ₇ NO ₂	4-Nitro- <i>o</i> -cresol.....	153.06	94.6			
2090	C ₇ H ₇ NO ₂	5-Nitro- <i>o</i> -cresol.....	153.06	118			
2091	C ₇ H ₇ NO ₂	6-Nitro- <i>o</i> -cresol.....	153.06	69.5			
2093	C ₇ H ₇ NO ₂	4-Nitro- <i>m</i> -cresol.....	153.06	129			
2094	C ₇ H ₇ NO ₂	5-Nitro- <i>m</i> -cresol.....	153.06	91			
2095	C ₇ H ₇ NO ₂	6-Nitro- <i>m</i> -cresol.....	153.06	56			
2096	C ₇ H ₇ NO ₂	3-Nitro-4-hydroxytoluene.....	153.06	36.5	125 ²²	1.240 ^{3,9}	1053
2098	C ₇ H ₇ NO ₂	<i>o</i> -Nitroanisol.....	153.06	9.4	277	1.268	749
2099	C ₇ H ₇ NO ₂	<i>m</i> -Nitroanisol.....	153.06	38	258	1.373	
2100	C ₇ H ₇ NO ₂	<i>p</i> -Nitroanisol.....	153.06	54	260	1.233	
2101	C ₇ H ₇ NO ₂	4-Amino-2-hydroxybenzoic acid.....	153.06	220			
2102	C ₇ H ₇ NO ₂	5-Amino-2-hydroxybenzoic acid.....	153.06	280 d.			
2103	C ₇ H ₇ NO ₂	6-Nitro-2-methoxyphenol.....	169.06	62			
2104	C ₇ H ₇ NO ₂	5-Nitro-2-methoxyphenol.....	169.06	104			
2105	C ₇ H ₇ NO ₂	3-Nitro-2-methoxyphenol.....	169.06	103			
2106	C ₇ H ₇ NO ₂ S	<i>o</i> -Sulfoaminobenzoic acid.....	201.13	167			
2107	C ₇ H ₇ NO ₂ S	<i>m</i> -Sulfoaminobenzoic acid.....	201.13	238			
2108	C ₇ H ₇ NO ₂ S	<i>p</i> -Sulfoaminobenzoic acid.....	201.13	280 d.			
2109	C ₇ H ₇ NO ₂ S	<i>p</i> -Nitrotoluene- <i>o</i> -sulfonic acid.....	217.13	130			
2110	C ₇ H ₇ NS	Thiobenzamide C ₆ H ₅ CSNH ₂	137.13	116			
2111	C ₇ H ₈	Tropylidene.....	92.062		118	0.888	686
2112	C ₇ H ₈	Toluene.....	92.062	-95.1	110.5	0.866	579
2114	C ₇ H ₇ BrN	4-Bromo- <i>o</i> -toluidine.....	185.99	32	257 d.		
2115	C ₇ H ₇ BrN	5-Bromo- <i>o</i> -toluidine.....	185.99	59.5	240		
2116	C ₇ H ₇ BrN	5-Bromo- <i>m</i> -toluidine.....	185.99	36	260	1.144 ¹⁰	
2117	C ₇ H ₇ BrN	6-Bromo- <i>m</i> -toluidine.....	185.99	78.8	240		
2118	C ₇ H ₇ BrN	2-Bromo- <i>p</i> -toluidine.....	185.99	26	257		
2119	C ₇ H ₇ BrN	3-Bromo- <i>p</i> -toluidine.....	185.99	26	240	1.498	
2120	C ₇ H ₇ ClN	4-Chloro- <i>o</i> -toluidine.....	141.53	22	238.5		
2120.1	C ₇ H ₇ ClN	5-Chloro- <i>o</i> -toluidine.....	141.53	30	239.2		
2121	C ₇ H ₇ ClN	6-Chloro- <i>o</i> -toluidine.....	141.53		245		
2122	C ₇ H ₇ ClN	2-Chloro- <i>m</i> -toluidine.....	141.53		229		
2123	C ₇ H ₇ ClN	4-Chloro- <i>m</i> -toluidine.....	141.53	30	230		
2124	C ₇ H ₇ ClN	5-Chloro- <i>m</i> -toluidine.....	141.53		243		
2125	C ₇ H ₇ ClN	6-Chloro- <i>m</i> -toluidine.....	141.53	83	241		
2126	C ₇ H ₇ ClN	2-Chloro- <i>p</i> -toluidine.....	141.53	26	245		
2127	C ₇ H ₇ ClN	3-Chloro- <i>p</i> -toluidine.....	141.53		219	1.151	
2128	C ₇ H ₈ N ₂	Benzalhydrazine C ₆ H ₅ CH ₂ NHNH ₂	120.08	16	140 ¹⁴		
2129	C ₇ H ₈ N ₂	Benzamidine C ₆ H ₅ C(:NH)NH ₂	120.08	80			
2130	C ₇ H ₈ N ₂ O	<i>o</i> -Aminobenzamide.....	136.08	108			
2131	C ₇ H ₈ N ₂ O	<i>m</i> -Aminobenzamide.....	136.08	79			
2132	C ₇ H ₈ N ₂ O	<i>p</i> -Aminobenzamide NH ₂ C ₆ H ₄ CONH ₂	136.08	183			
2133	C ₇ H ₈ N ₂ O	Benzoylhydrazine C ₆ H ₅ CONHNH ₂	136.08	112			
2134	C ₇ H ₈ N ₂ O	Nitrosomethylaniline.....	136.08	15	225 d.	1.121 ^{22,7}	998
2135	C ₇ H ₈ N ₂ O	Phenylurea C ₆ H ₅ NHCONH ₂	136.08	147			1330
2136	C ₇ H ₈ N ₂ O ₂	<i>o</i> -Nitromethylaniline.....	152.08	34			
2137	C ₇ H ₈ N ₂ O ₂	<i>m</i> -Nitromethylaniline.....	152.08	66			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2138	C ₇ H ₈ N ₂ O ₂	<i>p</i> -Nitromethylaniline.....	152.08	152		1.201 ^{188,3}	
2139	C ₇ H ₈ N ₂ O ₂	3-Nitro- <i>o</i> -toluidine.....	152.08	96		1.190 ¹⁹⁰	
2140	C ₇ H ₈ N ₂ O ₂	4-Nitro- <i>o</i> -toluidine.....	152.08	105		1.365 ¹⁸	
2141	C ₇ H ₈ N ₂ O ₂	5-Nitro- <i>o</i> -toluidine.....	152.08	127.5		1.366 ¹⁸	
2142	C ₇ H ₈ N ₂ O ₂	6-Nitro- <i>o</i> -toluidine.....	152.08	91.5		1.378 ¹⁸	
2143	C ₇ H ₈ N ₂ O ₂	2-Nitro-3-aminotoluene.....	152.08	53			
2144	C ₇ H ₈ N ₂ O ₂	4-Nitro-3-aminotoluene.....	152.08	109			
2145	C ₇ H ₈ N ₂ O ₂	5-Nitro-3-aminotoluene.....	152.08	98.4			
2146	C ₇ H ₈ N ₂ O ₂	6-Nitro-3-aminotoluene.....	152.08	138			
2147	C ₇ H ₈ N ₂ O ₂	2-Nitro-4-aminotoluene.....	152.08	77.5			
2148	C ₇ H ₈ N ₂ O ₂	3-Nitro- <i>p</i> -toluidine.....	152.08	117		1.312 ¹⁷	
2149	C ₇ H ₈ N ₂ O ₂	5-Nitro-3-amino-4-hydroxytoluene.....	168.08	110			
2150	C ₇ H ₈ N ₂ S	Phenylthiourea C ₆ H ₅ NHCSNH ₂	152.14	154			
2151	C ₇ H ₈ N ₂ O ₂	Theophylline.....	180.09	272			
2152	C ₇ H ₈ N ₂ O ₂	Paraxanthine.....	180.09	299			
2153	C ₇ H ₈ N ₂ O ₂	Theobromine.....	180.09	337			
2154	C ₇ H ₈ N ₂ O ₂	1, 3-Dimethyluric acid.....	196.09	410 d.			
2155	C ₇ H ₈ N ₂ O ₂	1, 7-Dimethyluric acid.....	196.09	390 d.			
2156	C ₇ H ₈ N ₂ O ₂	1, 9-Dimethyluric acid.....	196.09	400 d.			
2157	C ₇ H ₈ N ₂ O ₂	3, 9-Dimethyluric acid.....	196.09	340 d.			
2158	C ₇ H ₈ N ₂ O ₇	Guanidine picrate.....	288.11	290			
2159	C ₇ H ₈ O	Benzyl alcohol C ₆ H ₅ CH ₂ OH.....	108.06	-15.3	205.8	1.046	713
2160	C ₇ H ₈ O	<i>o</i> -Cresol.....	108.06	30.1	190.8	1.051	727
2161	C ₇ H ₈ O	<i>m</i> -Cresol.....	108.06	10	202.8	1.035	714
2162	C ₇ H ₈ O	<i>p</i> -Cresol.....	108.06	34.8	201.1	1.039 ^{18,8}	715
2163	C ₇ H ₈ O	Phenyl methyl ether (Anisol).....	108.06	-37.3	155.8	0.994	659
2164	C ₇ H ₈ O	4, 6-Dihydrobenzaldehyde.....	108.06	< -20	171.5 d.	1.020 ^{14,8}	
2165	C ₇ H ₈ OS	Thioguaiacol CH ₃ OC ₆ H ₄ SH.....	140.13		219		
2166	C ₇ H ₈ O ₂	<i>o</i> -Hydroxybenzyl alcohol.....	124.06	86		1.161	
2167	C ₇ H ₈ O ₂	<i>m</i> -Hydroxybenzyl alcohol.....	124.06	67	300 d.		
2168	C ₇ H ₈ O ₂	<i>p</i> -Hydroxybenzyl alcohol.....	124.06	110			
2169	C ₇ H ₈ O ₂	2, 4-Dihydroxytoluene.....	124.06	104			
2170	C ₇ H ₈ O ₂	2, 5-Dihydroxytoluene.....	124.06	125			
2171	C ₇ H ₈ O ₂	2, 6-Dihydroxytoluene.....	124.06	66			
2172	C ₇ H ₈ O ₂	Homocatechol 3, 4-(HO) ₂ C ₆ H ₃ CH ₃	124.06	65	252	1.129 ^{7,4}	1103
2173	C ₇ H ₈ O ₂	Orcinol 3, 5-(HO) ₂ C ₆ H ₃ CH ₃	124.06	108	290	1.290 ⁴	
2174	C ₇ H ₈ O ₂	Guaiacol <i>o</i> -HOC ₆ H ₄ OCH ₃	124.06	28	205.1	1.143 ¹⁸	1179
2175	C ₇ H ₈ O ₂	Resorcinol methyl ether.....	124.06	< -17.5	244.3	> 1	
2176	C ₇ H ₈ O ₂	Hydroquinol methyl ether.....	124.06	53	243		
2176.1	C ₇ H ₈ O ₂	Dimethyl- γ -pyrone.....	124.06	132		0.9953 ¹⁸⁷	
2178	C ₇ H ₈ O ₂	Furfurylacetone.....	124.06	40	229		
2179	C ₇ H ₈ O ₂ S	Toluene- <i>o</i> -sulfinic acid.....	156.13	80			
2180	C ₇ H ₈ O ₂	2, 5-Dimethylfurfurane-3-carboxylic acid (Uvinic acid).....	140.06	135			
2181	C ₇ H ₈ O ₂ S	Toluene- <i>o</i> -sulfonic acid.....	172.13		128.8 ²⁸		
2183	C ₇ H ₈ O ₂ S	Toluene- <i>p</i> -sulfonic acid.....	172.13	105	140 ²⁰		
2184	C ₇ H ₈ O ₄	Iretol 2, 4, 6-(OH) ₃ C ₆ H ₂ OCH ₃	156.06	186			
2185	C ₇ H ₈ O ₄	Hydrochelidonic anhydride.....	156.06	69	210		
2186	C ₇ H ₈ O ₄ S	4-Hydroxytoluene-2-sulfonic acid.....	188.13	188			
2187	C ₇ H ₈ O ₄ S	2-Hydroxytoluene-6-sulfonic acid.....	188.13	118			
2188	C ₇ H ₈ O ₄	Cinchonic acid.....	188.06	169			
2189	C ₇ H ₈ S	Benzyl mercaptan C ₆ H ₅ CH ₂ SH.....	124.13		195	1.058 ²⁰	
2190	C ₇ H ₈ S	<i>o</i> -Thiocresol <i>o</i> -CH ₃ C ₆ H ₄ SH.....	124.13	15	194.3		
2191	C ₇ H ₈ S	<i>m</i> -Thiocresol <i>m</i> -CH ₃ C ₆ H ₄ SH.....	124.13	< -20	195.4	1.052 ^{1,3}	
2192	C ₇ H ₈ S	<i>p</i> -Thiocresol <i>p</i> -CH ₃ C ₆ H ₄ SH.....	124.13	43	195		
2193	C ₇ H ₈ AsO ₃	Benzylarsonic acid C ₆ H ₅ CH ₂ AsO(OH) ₂	216.03	167			
2194	C ₇ H ₈ ClN ₂ O ₂	Theobromine hydrochloride.....	216.56				1333
2195	C ₇ H ₈ N	Benzylamine C ₆ H ₅ CH ₂ NH ₂	107.08		184	0.980	720
2196	C ₇ H ₈ N	2, 4-Lutidine.....	107.08		157	0.949 ⁹	
2197	C ₇ H ₈ N	2, 6-Lutidine.....	107.08		143	0.942 ⁹	
2198	C ₇ H ₈ N	3, 4-Lutidine.....	107.08		164.5		
2199	C ₇ H ₈ N	2-Ethylpyridine.....	107.08		148.8	0.950	990
2200	C ₇ H ₈ N	3-Ethylpyridine.....	107.08		165.3	0.959	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2201	C ₇ H ₇ N	4-Ethylpyridine.....	107.08		166	0.936	
2202	C ₇ H ₇ N	α -Lutidine.....	107.08		156.5	0.947 ^o	
2203	C ₇ H ₇ N	Methylaniline C ₆ H ₅ NHCH ₃	107.08	-57.0	195.70	0.986	757
2204	C ₇ H ₇ N	<i>o</i> -Toluidine <i>o</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	α -24.4; β -16.3	200.7	0.998	758
2205	C ₇ H ₇ N	<i>m</i> -Toluidine <i>m</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	-31.5	203.3	0.989	989
2206	C ₇ H ₇ N	<i>p</i> -Toluidine <i>p</i> -CH ₃ C ₆ H ₄ NH ₂	107.08	43.7	200.5	1.046	1087
2207	C ₇ H ₇ NO	<i>o</i> -Aminobenzyl alcohol.....	123.08	82	280 s. d.		
2208	C ₇ H ₇ NO	<i>p</i> -Aminobenzyl alcohol.....	123.08	95			
2209	C ₇ H ₇ NO	4-Amino-2-hydroxytoluene.....	123.08	161			
2210	C ₇ H ₇ NO	5-Amino-2-hydroxytoluene.....	123.08	175			
2211	C ₇ H ₇ NO	6-Amino-2-hydroxytoluene.....	123.08	128			
2212	C ₇ H ₇ NO	5-Amino- <i>m</i> -cresol.....	123.08	79	345		
2213	C ₇ H ₇ NO	4-Amino-3-hydroxytoluene.....	123.08	174			
2214	C ₇ H ₇ NO	2-Amino-4-hydroxytoluene.....	123.08	144.5			
2215	C ₇ H ₇ NO	3-Amino-4-hydroxytoluene.....	123.08	135			
2216	C ₇ H ₇ NO	<i>o</i> -Anisidine <i>o</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08	5.2	224	1.108 ⁸⁰	
2217	C ₇ H ₇ NO	<i>m</i> -Anisidine <i>m</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08		251		
2218	C ₇ H ₇ NO	<i>p</i> -Anisidine <i>p</i> -CH ₃ OC ₆ H ₄ NH ₂	123.08	57.7	245	1.071 ⁴⁸	
2219	C ₇ H ₇ NO	Benzylhydroxylamine C ₆ H ₅ CH ₂ NHOH.....	123.08		123 ⁸⁰		
2220	C ₇ H ₇ NO	Salicylamine <i>o</i> -OHC ₆ H ₄ CH ₂ NH ₂	123.08	129			
2221	C ₇ H ₇ NO	<i>m</i> -Tolylhydroxylamine.....	123.08	68			
2222	C ₇ H ₇ NO	<i>p</i> -Tolylhydroxylamine.....	123.08	94			
2223	C ₇ H ₇ NO	4, 6-Dihydrobenzaldoxime.....	123.08	44			
2224	C ₇ H ₇ NO ₂	6-Amino-2-methoxyphenol.....	139.08	127			
2225	C ₇ H ₇ NO ₂	Ammonium benzoate C ₆ H ₅ CO ₂ NH ₄	139.08	198		1.262 ⁴	
2226	C ₇ H ₇ NO ₂ S	Toluene- <i>o</i> -sulfoneamide.....	171.14	156.3			
2227	C ₇ H ₇ NO ₂ S	Toluene- <i>m</i> -sulfoneamide.....	171.14	108			
2228	C ₇ H ₇ NO ₂ S	Toluene- <i>p</i> -sulfoneamide.....	171.14	137.5			
2229	C ₇ H ₇ NO ₃	Ammonium salicylate.....	155.08				1333
2234.1	C ₇ H ₇ NO ₃ S	Ammonium <i>o</i> -sulfobenzoate.....	219.14	> 250		1.524	1200
2235	C ₇ H ₇ N ₂ O	1-Phenylsemicarbazide.....	151.09	172			
2236	C ₇ H ₇ N ₂ O	4-Phenylsemicarbazide.....	151.09	122			
2237	C ₇ H ₁₀	2, 3-Dihydrocycloheptene.....	94.077		121		
2238	C ₇ H ₁₀	1, 2-Dihydrotoluene.....	94.077		108		
2239	C ₇ H ₁₀	1, 3-Dihydrotoluene.....	94.077		110.1	0.835	524
2240	C ₇ H ₁₀	2, 4-Dihydrotoluene.....	94.077		106	0.827	498
2241	C ₇ H ₁₀	1, 3, 5-Heptatriene.....	94.077		114	0.764	
2243	C ₇ H ₁₀ ClN	<i>o</i> -Toluidine hydrochloride.....	143.54	214.5	242		
2244	C ₇ H ₁₀ ClN	<i>m</i> -Toluidine hydrochloride.....	143.54	228	249.8		
2245	C ₇ H ₁₀ ClN	<i>p</i> -Toluidine hydrochloride.....	143.54	239	257.5		
2247	C ₇ H ₁₀ N ₂	Methyl- <i>p</i> -phenylenediamine.....	122.09	35.5	259.5		
2248	C ₇ H ₁₀ N ₂	Benzylhydrazine C ₆ H ₅ CH ₂ NHNH ₂	122.09	26	103 ⁴¹		
2249	C ₇ H ₁₀ N ₂	2, 3-Diaminotoluene.....	122.09	62	255		
2250	C ₇ H ₁₀ N ₂	2, 4-Diaminotoluene.....	122.09	99	280		
2251	C ₇ H ₁₀ N ₂	2, 5-Diaminotoluene.....	122.09	64	274		
2252	C ₇ H ₁₀ N ₂	Toluylene-2, 6-diamine.....	122.09	105			
2253	C ₇ H ₁₀ N ₂	3, 4-Diaminotoluene.....	122.09	88.5	265		
2254	C ₇ H ₁₀ N ₂	3, 5-Diaminotoluene.....	122.09		285		
2255	C ₇ H ₁₀ N ₂	1, 1-Methylphenylhydrazine.....	122.09		227.5	1.040	766
2256	C ₇ H ₁₀ N ₂	<i>o</i> -Tolylhydrazine <i>o</i> -CH ₃ C ₆ H ₄ NHNH ₂	122.09	56			
2257	C ₇ H ₁₀ N ₂	<i>m</i> -Tolylhydrazine.....	122.09		224		
2258	C ₇ H ₁₀ N ₂	<i>p</i> -Tolylhydrazine <i>p</i> -CH ₃ C ₆ H ₄ NHNH ₂	122.09	61			
2259	C ₇ H ₁₀ N ₂ O ₃	5-Ethyl-5-methylbarbituric acid.....	170.09	212			
2260	C ₇ H ₁₀ N ₂ O ₃	Trimethylbarbituric acid.....	170.09	165			
2260.1	C ₇ H ₁₀ N ₂ O ₄	Dimethyl ureindihydroxysuccinate.....	234.10	203			1204
2260.2	C ₇ H ₁₀ N ₂ O ₇	Isohydroxydimethylurea.....	230.11	180			1212
2261	C ₇ H ₁₀ O	1, 2, 3, 4-Tetrahydrobenzaldehyde.....	110.08		212	1.009 ^o	
2262	C ₇ H ₁₀ O ₂	Δ^4 -Tetrahydrobenzoic acid.....	126.08			1.072 ^{47.3}	552
2263	C ₇ H ₁₀ O ₃	Diacetylacetone CO(CH ₃ COCH ₃) ₂	142.08	49	121 ¹⁰	1.068 ⁴⁰	1090
2264	C ₇ H ₁₀ O ₄	<i>cis</i> -Pentamethylene-1, 2-dicarboxylic acid.....	158.08	140			
2265	C ₇ H ₁₀ O ₄	Teraconic acid.....	158.08	161 d.			
2266	C ₇ H ₁₀ O ₄	Terebic acid.....	158.08	175		0.816	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2267	C ₇ H ₁₀ O ₄	Dimethyl citraconate.....	158.08		210.5	1.110	922
2268	C ₇ H ₁₀ O ₅	3-Ketopimelic acid.....	174.08	143			
2269	C ₇ H ₁₀ O ₅	Ethyl mesoxalate (HO) ₂ C(CO ₂ C ₂ H ₅) ₂ ..	174.08	< -31	220	1.119 ²⁰	
2270	C ₇ H ₁₀ O ₅	Quinic lactone.....	174.08	187			
2271	C ₇ H ₁₁ BrO ₄	Diethyl bromomalonate.....	239.00		235	1.426 ¹⁶	
2272	C ₇ H ₁₁ NO	Nortropinone.....	125.09	70			
2273	C ₇ H ₁₁ NO ₂	Arecaidine.....	141.09	224 d.			
2274	C ₇ H ₁₁ NO ₂	Arecaine.....	141.09	214 d.			
2275	C ₇ H ₁₂	<i>n</i> -Amylacetylene C ₆ H ₁₁ C:CH.....	96.092	> -70	110.5	0.738 ^{12,6}	160
2276	C ₇ H ₁₂	2, 4-Dimethyl-1, 3-pentadiene.....	96.092		93.3	0.749 ¹²	815
2277	C ₇ H ₁₂	2, 4-Dimethyl-2, 3-pentadiene.....	96.092		70		
2278	C ₇ H ₁₂	3-Heptene C ₆ H ₇ C:CC ₂ H ₅	96.092		106	0.760 ⁹	
2279	C ₇ H ₁₂	2, 4-Heptadiene.....	96.092		107	0.731	896
2280	C ₇ H ₁₂	2-Heptene CH ₃ C:CC ₂ H ₅	96.092		113.3	0.763 ⁹	
2281	C ₇ H ₁₂	4-Methylcyclohexene.....	96.092		102.2	0.800	385
2282	C ₇ H ₁₂	Δ ¹ -Tetrahydrotoluene.....	96.092		111	0.809	431
2283	C ₇ H ₁₂	Δ ² -Tetrahydrotoluene.....	96.092		105	0.805	408
2284	C ₇ H ₁₂	Δ ³ -Tetrahydrotoluene.....	96.092		103	0.799	394
2284.1	C ₇ H ₁₂ Cl ₂ O ₂	Isobutyl 1, 2-dichloropropionate.....	199.01			1.156 ²¹	
2285	C ₇ H ₁₂ N ₂ O	Sinapoline.....	140.11	100			
2286	C ₇ H ₁₂ N ₄ O	Caffeidine.....	168.12	94			
2287	C ₇ H ₁₂ N ₄ O ₃	Caffoline.....	200.12	197			
2288	C ₇ H ₁₂ O	Diallyl carbinol (CH ₂ :CHCH) ₂ CHOH..	112.09		151	0.857	
2289	C ₇ H ₁₂ O	Hexahydrobenzaldehyde.....	112.09		161	0.926	
2289.1	C ₇ H ₁₂ O	<i>o</i> -Methylcyclohexanone.....	112.09		167 ⁷⁴⁰	0.930 ^{16,1}	842
2289.2	C ₇ H ₁₂ O	<i>m</i> -Methylcyclohexanone.....	112.09		60 ¹⁶	0.914 ^{16,2}	1027
2289.3	C ₇ H ₁₂ O	<i>p</i> -Methylcyclohexanone.....	112.09		56.4 ^{10,5}	0.912 ^{24,4}	1021
2290	C ₇ H ₁₂ O	Suberone <(CH ₂ CH ₂ CH ₂) ₂ > CO.....	112.09		179.5	0.969 ⁹	
2291	C ₇ H ₁₂ O ₂	Pimelic aldehyde OCH(CH ₂) ₄ CHO.....	128.09		112 ¹³		
2292	C ₇ H ₁₂ O ₂	Teracrylic acid.....	128.09	< -18	218		
2293	C ₇ H ₁₂ O ₂	Hexahydrobenzoic acid.....	128.09	31	233	1.048	1040
2294	C ₇ H ₁₂ O ₂	1, 2-Isoheptenic acid.....	128.09	16.5	227	0.942	442
2295	C ₇ H ₁₂ O ₂	Allyl butyrate C ₆ H ₇ CO ₂ CH ₂ CH:CH ₂ ..	128.09		143		
2296	C ₇ H ₁₂ O ₂	Allyl isobutyrate.....	128.09		133.5		
2297	C ₇ H ₁₂ O ₂	Cyclohexyl formate HCO ₂ C ₆ H ₁₁	128.09	< 0	162.5	1.010 ⁹	
2298	C ₇ H ₁₂ O ₂	Ethyl angelate.....	128.09		142	0.918	963
2299	C ₇ H ₁₂ O ₂	Ethyl tiglate CH ₃ CH:C(CH ₃)CO ₂ C ₂ H ₅ ..	128.09		152	0.924	964
2300	C ₇ H ₁₂ O ₃	Hexahydrosalicylic acid.....	144.09	111			
2301	C ₇ H ₁₂ O ₃	Ethyl levulinate.....	144.09		205.3	1.017 ¹⁶	263
2302	C ₇ H ₁₂ O ₃	Ethyl methylacetoacetate.....	144.09		186.8	1.019	239
2303	C ₇ H ₁₂ O ₃	Methyl dimethylacetoacetate.....	144.09		174	0.999 ¹⁶	
2304	C ₇ H ₁₂ O ₄	Butylmalonic acid C ₆ H ₉ CH(CO ₂ H) ₂ ..	160.09	101.5	150 d.		
2305	C ₇ H ₁₂ O ₄	Isobutylmalonic acid.....	160.09	107			
2306	C ₇ H ₁₂ O ₄	<i>sec</i> -Butylmalonic acid.....	160.09	76			
2307	C ₇ H ₁₂ O ₄	Diethylmalonic acid (C ₂ H ₅) ₂ C(CO ₂ H) ₂ ..	160.09	121			
2308	C ₇ H ₁₂ O ₄	<i>n</i> -Pimelic acid HO ₂ C(CH ₂) ₄ CO ₂ H.....	160.09	103	272 ¹⁰⁰		
2308.1	C ₇ H ₁₂ O ₄	Trimethylsuccinic acid.....	160.09	152		1.242	
2309	C ₇ H ₁₂ O ₄	Diethyl malonate CH ₂ (CO ₂ C ₂ H ₅) ₂	160.09	-49.9	198.9	1.054	208
2310	C ₇ H ₁₂ O ₄	Dimethyl pyrotartrate.....	160.09		198	1.078	
2311	C ₇ H ₁₂ O ₄	Methyl ethyl succinate.....	160.09	< -20	208.2	1.093 ⁹	
2312	C ₇ H ₁₂ O ₄	Glycerol diacetate (Diacetin).....	176.09		176 ⁴⁰	1.178 ¹⁶	
2313	C ₇ H ₁₂ O ₄	Quinic acid.....	192.09	163	d.	1.637	1333
2314	C ₇ H ₁₂ O ₄	Diethyl mesoxalate.....	192.09	57	200		
2315	C ₇ H ₁₂ BrN ₂ O ₂	Adalin CH ₂ BrCONHCON(C ₂ H ₅) ₂	237.03	116			
2316	C ₇ H ₁₂ BrO ₂	Ethyl 1-bromo- <i>n</i> -valerate.....	209.02		192	1.226 ¹³	
2317	C ₇ H ₁₂ BrO ₂	Ethyl 1-bromoisovalerate.....	209.02		186	1.278 ¹²	
2318	C ₇ H ₁₂ ClO ₂	Amyl chloroacetate ClCH ₂ CO ₂ C ₆ H ₁₁ ..	164.56		192	1.055	345
2319	C ₇ H ₁₂ ClO ₂	Isoamyl chloroacetate.....	164.56		192	1.041 ²⁵	
2320	C ₇ H ₁₂ N	Heptylnitrile C ₆ H ₁₃ CN.....	111.11		183	0.815	240
2321	C ₇ H ₁₂ NO	Nortropanol.....	127.11	161			
2322	C ₇ H ₁₂ NO	Suberoxime (CH ₂ CH ₂ CH ₂) ₂ C:NOH....	127.11	23	230	1.023	
2323	C ₇ H ₁₂ NO ₂	Stachydrine.....	143.11	210			
2324	C ₇ H ₁₂ NO ₂	Quinic amide (OH) ₄ C ₆ H ₇ CONH ₂	191.11	132			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2325	C ₇ H ₁₄	2, 4-Dimethyl-2-pentene.....	98.108		84	0.699 ²⁵	
2326	C ₇ H ₁₄	3-Ethyl-2-pentene (C ₂ H ₅) ₂ C:CHCH ₃ ...	98.108		98	0.725 ¹⁵	192
2327	C ₇ H ₁₄	Heptamethylene (Cycloheptane).....	98.108		118.1	0.811	405
2328	C ₇ H ₁₄	Hexahydrotoluene.....	98.108	-147.5	103	0.764	910
2329	C ₇ H ₁₄	2-Heptene CH ₃ CH:CHC ₂ H ₅	98.108		98.5		
2330	C ₇ H ₁₄	Methylcyclohexane.....	98.108	-126.4	100.8	0.764	272
2331	C ₇ H ₁₄	3-Methyl-2(3)-hexene.....	98.108		97.4	0.718	186
2332	C ₇ H ₁₄	1-Heptene C ₆ H ₁₁ CH:CH ₂	98.108		99		
2333	C ₇ H ₁₄	2, 2, 3-Trimethyl-1-butene.....	98.108		80		
2334	C ₇ H ₁₄	2, 3-Dimethyl-2-pentene.....	98.108		95.1	0.719	
2335	C ₇ H ₁₄ O	Cycloheptanol.....	114.11		185.2	0.958	
2336	C ₇ H ₁₄ O	2-Heptene-4-ol.....	114.11		63 ¹¹	0.842 ^{14, 4}	838
2337	C ₇ H ₁₄ O	Hexahydrobenzyl alcohol.....	114.11		181.2	0.916	816
2338	C ₇ H ₁₄ O	1-Methylcyclohexane-1-ol.....	114.11	26	168.3	0.919 ²⁶	1029
2339	C ₇ H ₁₄ O	<i>o</i> -Hexahydrocresol.....	114.11		169	0.923	478
2340	C ₇ H ₁₄ O	<i>m</i> -Hexahydrocresol.....	114.11	-47	176	0.914	466
2341	C ₇ H ₁₄ O	<i>dl-m</i> -Hexahydrocresol.....	114.11		175	0.923	467
2342	C ₇ H ₁₄ O	<i>p</i> -Hexahydrocresol.....	114.11		174	0.924 ¹⁴	833
2343	C ₇ H ₁₄ O	Heptaldehyde C ₆ H ₁₃ CHO.....	114.11	-45.0	155	0.850	202
2344	C ₇ H ₁₄ O	Dipropyl ketone (C ₃ H ₇) ₂ CO.....	114.11	-32.6	143.5	0.821 ¹⁵	173
2345	C ₇ H ₁₄ O	Diisopropyl ketone [(CH ₃) ₂ CH] ₂ CO.....	114.11		123.7	0.806	
2346	C ₇ H ₁₄ O	Ethyl <i>n</i> -butyl ketone C ₂ H ₅ COC ₄ H ₉	114.11		148.5		
2347	C ₇ H ₁₄ O	Ethyl isobutyl ketone.....	114.11		136	0.815	
2348	C ₇ H ₁₄ O	Methyl <i>n</i> -amyl ketone CH ₃ COC ₅ H ₁₁	114.11		150	0.822 ¹⁶	
2349	C ₇ H ₁₄ O	Methyl isoamyl ketone.....	114.11		144	0.821 ¹⁷	
2350	C ₇ H ₁₄ O ₂	Isoamylacetic acid.....	130.11		216.5	0.926 ¹⁶	
2351	C ₇ H ₁₄ O ₂	Heptylic acid C ₆ H ₁₃ CO ₂ H.....	130.11	-10	223.5	0.922	269
2353	C ₇ H ₁₄ O ₂	<i>n</i> -Amyl acetate CH ₃ CO ₂ C ₆ H ₁₃	130.11		147.6	0.879 ²⁰	130
2354	C ₇ H ₁₄ O ₂	Isoamyl acetate.....	130.11		142.5	0.875	122
2354.1	C ₇ H ₁₄ O ₂	<i>d-β</i> -Amyl acetate.....	130.11		131	0.868	100
2355	C ₇ H ₁₄ O ₂	<i>tert</i> -Amyl acetate.....	130.11		124.8	0.874 ¹⁹	
2356	C ₇ H ₁₄ O ₂	Ethyl <i>n</i> -valerate C ₄ H ₉ CO ₂ C ₂ H ₅	130.11		145.5	0.877	1109
2357	C ₇ H ₁₄ O ₂	Ethyl isovalerate.....	130.11	-99.3	135	0.866	126
2358	C ₇ H ₁₄ O ₂	<i>n</i> -Hexyl formate HCO ₂ C ₆ H ₁₃	130.11		153.6	0.898 ⁰	
2359	C ₇ H ₁₄ O ₂	Isobutyl propionate.....	130.11	-71.4	138	0.869	108
2359.1	C ₇ H ₁₄ O ₂	<i>d-sec</i> -Butyl propionate.....	130.11		132	0.8657	
2360	C ₇ H ₁₄ O ₂	Methyl <i>n</i> -caproate C ₆ H ₁₃ CO ₂ CH ₃	130.11		149.5	0.904 ²	
2361	C ₇ H ₁₄ O ₂	Propyl <i>n</i> -butyrate C ₃ H ₇ CO ₂ C ₄ H ₉	130.11	-95.2	143	0.879 ¹⁵	123
2362	C ₇ H ₁₄ O ₂	Propyl isobutyrate (CH ₃) ₂ CHCO ₂ C ₃ H ₇	130.11		135.4	0.884 ²	97
2363	C ₇ H ₁₄ O ₂	Isopropyl butyrate C ₃ H ₇ CO ₂ CH(CH ₃) ₂	130.11		128	0.865 ¹³	
2364	C ₇ H ₁₄ O ₂	Isopropyl isobutyrate.....	130.11		120.8	0.869 ²	
2365	C ₇ H ₁₄ O ₃	Di- <i>n</i> -propyl carbonate CO(OC ₃ H ₇) ₂	146.11		168.2	0.968 ²¹	
2366	C ₇ H ₁₄ O ₃	Ethyl butyl carbonate.....	146.11		169		
2367	C ₇ H ₁₄ O ₄	Glycerol 1-butyrate.....	162.11		271		
2367.1	C ₇ H ₁₄ O ₆	<i>l</i> -Methyl rhamnoside.....	178.11	109			1227
2368	C ₇ H ₁₄ O ₆	α -Methyl galactoside.....	194.11	112			
2369	C ₇ H ₁₄ O ₆	β -Methyl galactoside.....	194.11	176			
2370	C ₇ H ₁₄ O ₆	α -Methyl glucose.....	194.11	161			
2371	C ₇ H ₁₄ O ₆	β -Methyl glucose.....	194.11	135			
2372	C ₇ H ₁₄ O ₆	α -Methyl glucoside.....	194.11	168	200 ^{0.3}		1230
2373	C ₇ H ₁₄ O ₆	β -Methyl glucoside.....	194.11	104			1171
2373.1	C ₇ H ₁₄ O ₆	α -Methyl mannoside.....	194.11	194			1217
2374	C ₇ H ₁₄ O ₆	<i>d</i> -Inositol methyl ether (β -Pinite).....	194.11	187		1.52	
2375	C ₇ H ₁₄ O ₆	<i>l</i> -Inositol methyl ether (Quebrachite).....	194.11	191	210 ^{vac.}	1.54	
2376	C ₇ H ₁₄ O ₇	<i>d, β</i> -Galaheptose.....	210.11	199			
2377	C ₇ H ₁₄ O ₇	<i>d, α</i> -Glucoheptose.....	210.11	215 d.			
2378	C ₇ H ₁₄ O ₈	<i>d</i> -Mannoheptonic acid.....	226.11	175 d.			
2379	C ₇ H ₁₄ S	<i>m</i> -Hexahydrothiocrisol.....	130.17		174		
2380	C ₇ H ₁₃ Br	<i>n</i> -Heptyl bromide C ₇ H ₁₅ Br.....	179.03		178.8	1.133 ¹⁶	
2381	C ₇ H ₁₃ Cl	<i>n</i> -Heptyl chloride C ₇ H ₁₅ Cl.....	134.57		159.5	0.881 ¹⁶	
2382	C ₇ H ₁₃ F	<i>n</i> -Heptyl fluoride C ₇ H ₁₅ F.....	118.12	-73	119.2	0.804	61
2383	C ₇ H ₁₃ I	<i>n</i> -Heptyl iodide C ₇ H ₁₅ I.....	226.05		203.8	1.401 ⁰	469
2384	C ₇ H ₁₃ N	Ethylpiperidine.....	113.12		128	0.857 ²²	1000

VOLUME I

ERRATA

PAGE		PAGE
xviii & xix	Ready Reference Tables. Between (c) and (d) insert Boiling points (inorganic).....162. To (d) entry add 165, 276. Between (d) and (e) insert Index to minerals.....174; Index to C-Table.....280.	
4	Column 4. For Columbia read Colombia.	
7	Column 3, under Mass. For 453.592 45 read 453.592 43. For 64.798 182 read 64.798 9182.	
8	Column 1, 1 bushel. For 35.367 7048 l read 36.367 7048 l.	
10	Column 1. For 1 mal = 10 a read 1 mål or maal = 9.843 or 10 a.	
12	Column 2. For 1 alm read 1 aln 1 famm read 1 famn 1 stang = 16 1 stång = 10 or 16	
	Column 3, under Mass. For skålpund read skålpund 1 as 1 aae 1 quintin 1 kvintin 1 uns 1 uns 1 nyläst = 12 000 1 nyläst = 10 000 or 12 000 Add 1 kora = 1000 1 ort = 100 Column 3, under Capacity, dry. Delete 1 ort = 10. For 1 junkfra read 1 jungfru or jumfru 1 quarter 1 kvarter 1 kappar 1 kappe 1 fjerdingar 1 fjärding 1 spanna 1 spann	
13	Column 1, 1 saah. For 1 sa read 1 s.	
17	Column 1, (v). For p. 27 read p. 38.	
	Accepted Basic Constants. Regarding Uncertainty column add These values are rough estimates and those for ϵ , e/m_0 and h should probably be several times as great as the values given.	
18	Section A. These Derived Constants have been computed from the Accepted Basic Constants on p. 17, and are vitiated by the errors in those values. The greatest errors occur in ν_∞ and N_∞ , which differ from the best experimental values by about 0.4%, the computed value of ν_∞ being too small. For ν_∞ read ν_∞ .	
	Section B, logis A. For 4.808 7827 read 3.808 7827.	
23	Table 28, last line. For 15.5951 read 13.5951. For 1.192 9882 read 1.133 3824.	
26	Table 48. For 1.0000 lambert 0.000 0000 1.0764 millilambert 0.031 9684 read 3.1418 lambert 0.497 1499 3.3818 millilambert 0.529 1183	
34	Column 2, line 1. For 980.655 read 980.665.	
42	Column 1. For Synodical read Synodical.	
49	Column 1. For X read Xe.	
52	For F. O. Fairchild read C. O. Fairchild.	
62	Column 2. For above 20° read below 20°.	
66	Section (a), Phosphorus pentasulfide. For 52° read 522°.	
91	High Vacuum Technique line 1, for Amount read Mass. line 6, after molecules add striking 1 cm ² sec ⁻¹ . line 11, for Q = amount read Q = volume.	
102	The Gaseous State, viscosity column. A, for 221 read 222. Br, for 155 read 154. Air, for 284.2 read 180.8.	
106	Line 1. For Smithers read Smither. Line 3. For John C. W. Fraser read J. C. W. Fraser. Index No. 6. For -76 read -59. Index No. 25.1. Delete 1 in density column for 3.1822.	
109	Index No. 204, d ₄ ²⁰ . Add 3.022. Index No. 205, d ₄ ²⁰ . Add 4.49. Index No. 206, d ₄ ²⁰ . Add 3.63.	
110	Index No. 259. Delete entry.	
115	Index No. 560. For Attaitte read Altaite.	
119	Index No. 768. Delete entry.	
	Index No. 767. For 45.5 read 44.07.	
122	Index No. 940. Add Eriochalcite.	
	Index No. 1001. For Phosphochalite read Phosphochalcite.	
128	Index No. 1354. For Ssomolnokite read Ssomolnikite.	
	Index No. 1355. For Siderotilite read Siderotilite.	
129	Index No. 1394. For FeCO ₃ .H ₂ O read FeCO ₃ . For 133.855 read 115.84.	
131	Index No. 1507. For 2.8181 read 4.13.	
133	Index No. 1631. For Crocoite read Crocoite.	
134	Index No. 1683. Insert Tungstenite.	
	Index No. 1726. For UO ₃ .CO ₂ read UO ₃ .CO ₂ .	
136	Index No. 1819. For BN ₂ read BN. For 38.8360 read 24.8280.	
139	Index No. 1990. Insert Monasite.	
143	Index No. 2236. For Hydrophyllite read Hydrophilite.	
149	Index No. 2622. For d. 29.6 read 29.88.	
152	Index No. 2807. Probably a decahydrate, v. Conroy, 54, 17: 104; 98.	
153	Index No. 2877. For 3.55 read 2.55.	

PAGE		PAGE
155	Index No. 2968. For 96 read 256 d.	
	Index No. 2994. For KC ₁₅ H ₁₂ O ₇ read KC ₁₅ H ₁₂ O ₈ .	
165	Serial No. 1. For 1.833 read 1.1833.	
174	Column 1. For Apiohnite read Apiohnite. Delete Arsenic siderite.	
	Column 2, Automolite. For 1119 read 1911.	
	Column 3. For Cerargyrite read Cerargyrite.	
	Column 4. For Chrysotile read Chrysotile. For Cotunnite read Cotunnite.	
	Column 5. For Durfeldtite read Dürfeldtite.	
	Column 6. For Eriochalite read Eriochalcite. For Gano-hyllite read Ganophyllite.	
175	Column 1. For Geocromite read Geocronite. For Jeremejerite read Jeremejevite.	
	Column 3. For Molybdophyllite read Molybdophyllite. After Molybite insert Monasite, 1990.	
	Column 4. For Phosphochalite read Phosphochalcite. Polianite. For (Pyrosulite) read (Pyrolusite).	
	Column 5, Scheelite. For 2366.1 read 2366. After Spencerite insert Sperryite, 1179.	
175	Column 5. For Ssomolnokite read Ssomolnikite. For Tennantite read Tennantite.	
	Column 6. After Tsamite insert Tungstenite, 1683. For Urvölgite read Urvölgite.	
176	Index No. 20. Delete 2.53.	
179	Index No. 232. Delete 1.7.	
180	Index No. 263. For 1.617 read 0.6606.	
183	Index No. 435. For NH(COCH ₃) ₂ read NH ₂ CONHCOCH ₃ .	
187	Index No. 686. For -18 read -5.	
188	Index No. 725. For CH ₃ COC ₂ H ₅ read CH ₃ CO ₂ C ₂ H ₅ .	
	Index No. 773.1. For Methyl read Methyl.	
192	Index No. 1012. For C ₆ H ₁₁ CO ₂ H read C ₆ H ₅ CO ₂ H.	
193	Index No. 1074. For Dimethyl read Dimethyl.	
200	Index Nos. 1466, 1468, and 1470. Data probably not for pure compounds. o-Dihydrobenzene and 1, 3-cyclohexadiene are two names for the same compound.	
214	Index No. 2328. Delete entry. Index No. 2330. For -126.4 read -126.3 100.8 100.3 0.764 0.7864	
220	Index Nos. 2719, 2720, and 2721. For Cresyl read Toly.	
224	Index No. 2942. For 2-Ethylhexane CH ₃ (C ₂ H ₅)CHC ₂ H ₅ read 3-Ethylhexane (C ₂ H ₅) ₂ CHC ₂ H ₅ .	
	Index No. 2942.1. Delete entry.	
227	Index No. 3123. For C ₅ H ₁₀ O ₃ read C ₅ H ₁₀ N ₂ O ₃ .	
	Index Nos. 3150, 3151, and 3152. For Cresyl read Toly.	
234	Index No. 3576. For C ₆ H ₅ CH:CHC ₂ H ₅ read C ₆ H ₅ CH ₂ C:CC ₂ H ₅ .	
235	Index No. 3635. For Benzacetin read 5-Acetylaminio-2-methoxybenzene-1-carboxylic acid.	
238	Index No. 3848. For C ₁₀ H ₁₆ O read (C ₁₀ H ₁₆ O) ₂ 152.12 456.36 295 310 Index No. 3862. For [C ₁₀ H ₁₆ O] ₂ read (C ₁₀ H ₁₆ O) ₂ [152.12] ₂ 456.36 264 285	
242	Index No. 4078. Add 5-Acetylaminio-2-ethoxybenzene-1-carboxylic acid.	
247	Index No. 4394. 1.525 is the density for the monohydrate.	
253	Index No. 4734. For Cresyl read Toly. For p-CH ₃ C ₆ H ₄ O ₂ CC ₂ H ₅ read p-CH ₃ C ₆ H ₄ O ₂ CC ₂ H ₅ .	
	Index Nos. 4736, 4741, 4742, and 4744. For Cresyl read Toly.	
254	Index Nos. 4778, 4779, and 4780. For Cresyl read Toly.	
258	Index No. 5057. For C ₁₅ H ₁₃ N ₃ read C ₆ H ₁₃ N ₃ . For 233.12 read 127.124.	
260	Index No. 5152. For capronate read caproate.	
262	Index No. 5291. For Chinosol read Quinosol.	
266	Index Nos. 5547, 5550. For Jelsemine read Gelsemine.	
268	Index No. 5653. For Strychine read Strychnine.	
269	Index No. 5711. For Gelsemine read Gelseminine.	
270	Index No. 5779. For o-Cresol read o-Tritolyl.	
271	Index No. 5902. Delete entry.	
272	Index No. 5928. For C ₂₇ H ₅₂ O ₁₆ read C ₂₇ H ₅₀ O ₁₆ . 612.25 610.23 183 190	
274	Index No. 5967. For Octocosane read Octacosane. Index No. 6054. For capronate read caproate. Index No. 6082. For Filicix read Filicic. Index No. 6096. Delete entry.	
275	Index No. 6110. For caprinat read caprate.	
278	Serial No. 910. Delete entry.	
280	Column 3. After p-Acetylaminobenzoic acid insert 5-Acetylaminio-2-ethoxybenzene-1-carboxylic acid, 4078. Column 4. After o-Acetylaminomethoxybenzene insert 5-Acetylaminio-2-methoxybenzene-1-carboxylic acid, 3635.	
282	Column 4, Benzacetin. Delete 3635.	
285	Column 1. For Cerebrin, 5931, 6153 read Cerberin, 5931 Cerebrin, 6153	

PAGE

- 286 Column 3. Delete 14 entries, beginning with *o*-Cresyl acetate 3150 and ending with *p*-Cresyl salicylate, 4743. Delete *o*-Cresyl orthoacetate, 5779.
- 290 Column 4. After *m*-Cymene insert *p*-Cymene, 3728.1.
- 291 Column 4. Ergosterol. Delete 5902.
- 292 Column 3. Delete 2-Ethylhexane, 2942.
- 3-Ethylhexane. For 2942.1 read 2942.
- Ethyl hippurate. For 4516 read 4077.1.
- Column 2, Filicic acid. For 6096 read 6082.
- Filicic acid. Delete entry.
- Column 3. For Gelsemine, 5711 read Gelsemine, 5547
- Gelseminine, 5711
- Column 4, Gelsemine, 5547 and Gelsemine hydrochloride, 5550. Delete entries.
- 300 Column 4, *N*-Phenylthiourethane. For 321 read 3201.
- 301 Column 4, Pyrene. For 5206 read 5026.
- 302 Column 2. After Quinoneoxime insert Quinosol, 5291.
- 303 Column 1, Terephthalic acid. Delete entry.
- 304 Column 2. For Toluylene-3, 5-diamine insert
- o*-Tolyl acetate, 3150
- m*-Tolyl acetate, 3151
- p*-Tolyl acetate, 3152
- After *p*-Tolylantipyrine insert
- m*-Tolyl benzoate, 4736.
- p*-Tolyl benzoate, 4734.
- After *p*-Tolyl dimethylpyrasolone insert
- o*-Tolyl ether, 4778.
- m*-Tolyl ether, 4779.
- p*-Tolyl ether, 4780.
- After *p*-Tolyl isothiocyanate insert
- o*-Tolyl methyl ether, 2719.
- m*-Tolyl methyl ether, 2720.
- p*-Tolyl methyl ether, 2721.
- After *p*-Tolyl mustard oil insert
- o*-Tolyl salicylate, 4741.
- m*-Tolyl salicylate, 4742.
- p*-Tolyl salicylate, 4743.
- 305 Column 3. After Trithioglycerol insert *o*-Tritolyl orthoacetate, 5779.
- 306 Column 2, Xanthine. Delete entry.
- Property-Substance Tables, —150: Delete 2328.
- 307 50: For 4516 read 4077.1.
- 308 96: Delete 32968
- 116: After 33347 insert 67.
- 255: After 4931 insert 32968.
- 261: Delete 3862.
- 285: After 2620 insert 3862.
- 292: Delete 3848.
- 310 310: After 1385 insert 3846.
- 93: Delete 171.
- 106: Delete 2328.
- 115: Delete 2942.1.
- 116: Delete 67.
- 180: For 4516 read 4077.1.
- 0.760: Delete 2328 and 2330.
- 313 $C_{11}H_{14}O_2$. For capronate read caproate.
- 319 $C_{17}H_{34}O_2$. For caprinate read caprate.
- 322 $SrC_2H_4O_6S_2 \cdot H_2O$. For Strontium disulfonate read Strontium ethane disulfonate.
- 331 $C_{11}H_{11}O_2N$. For Glutaric aniline read Glutaricanilide.
- 353 (355), Sasahara. For 329 read 210.
- 358 Odoriferous Materials, Classification.
- For fragante: read fragantes
- Allyl Allyaceous
- emphyreumatic emphyreumatici
- tetri tetrici
- nauseois nauseosi
- 360 Column 1, line 3. For 6.06×10^{21} read 6.06×10^{22} .
- Columns 1 and 2, table heading. For Molecules per cc read Molecules per 0.01 cm^3 .

PAGE

- 362 Column 2, line 8. For $V = 0.0342a^{1/2}$ read $V = 0.0342a^{1/4}$.
- Above Remarks Concerning the Nomenclature there should be a rule extending across entire page.
- Column 2, Note 9. For DAI read DAI.
- 363 Series of Thorium, Thoron. For 0.574 read 0.0574.
- 364 Column 2, Tables (b) and (c). For cm^{-2} read cm^2 .
- 366 Chemical Effects of α -Particles, column 1, line 3. After α -particles insert in the time the M are reacting.
- equation, line 12. For \ln read \log_e .
- 368 Column 1, line 4. For $T_{1/2}$ read T (cf. p. 362, column 1, line 14).
- 372 Column 2, Literature.
- (4). For 181:1751 read 180:1750.
- (10). 10:11 11:628
- 373 Lit. column. For (88) read (88).
- 375 Lit. column. For (97) read (98).
- 376 Column 2. For Japan (42) read Japan (41).
- 377 Column 2, Hokutolite. For (42) read (41).
- Column 2, S. For Skaldovskite read Sklodowskite.
- Column 2, Torbernite. For $(\text{UCaPO}_3)_2$ read $(\text{UCuPO}_3)_2$.
- Column 2, Y. For Yitrotantalite read Yitrotantalite.
- 379 Oceanic Deposits. Data from (138) have been superseded by the the author's later work (Joly, 3, 24:694:12) and should read:
- | | No. specimens | Ra mean |
|--------------------------|---------------|---------|
| Blue mud | | |
| 1240 fath | 1 | 1.5 |
| "Ooze" | | |
| 720 fath | 1 | 1.7 |
| Globigerina ooze | | |
| 199 to 2493 fath | 4 | 3.3 |
| 3 of above samples | | 3.1 |
| Radiolarian ooze | | |
| 2600 to 2750 fath | 2 | 13.1 |
| Red clay | | |
| 2350 fath | 1 | 11.0 |
- 380 The Loetschberg Tunnel. For Aplete read Aplite.
- Meteorites, Remarks. For hexahydrite read hexahedrite.
- 381 Column 1, line 2 of table. For Anondoga read Onondaga.
- Column 2, (138). For Joly, 3, 16:190:18 read Joly, 3, 16:190:08.
- 382 Lines 2 and 3 of table. For Felixstowe read Felixstowe.
- Line 16 of table. For Frier read Friar.
- Line 29 of table. For Charnokite read Charnockite.
- 392 Characteristics of Members of Solar System.
- Sidereal rotation of Sun. For 25.3 read 25.0.
- Number of satellites. Mars For 0 read 2
- Jupiter 7 9
- Saturn 9 10
- Column 1, line 2 bottom. For 24 da and 30 da read 24.5 da and 30.6 da, respectively.
- Column 2, Constant of notation. For notation read nutation.
- Column 2, Constant of aberration. Add this note: Astronomers now generally accept a value near 20.52, but the Paris conference value is used in the computation of the national ephemerides.
- Column 2, Solar parallax. Add this note: The direct determination (8.806'') is by far the most reliable; the one from the velocity of light is based upon the value for the constant of aberration adopted at the Paris conference of 1896, which is smaller than the value now generally accepted. The two others are from the nature of the case somewhat uncertain.
- Column 2, Inclination of Moon's orbit to ecliptic. For about 5° read $5^\circ 8' 43''$.
- 394 Table 1, item 6. For meridonal read meridional.
- 398 Column 1, Greenwich, g . For 981.184 read 981.188.
- Column 1, Kew, g . For 981.144 read 981.201.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2385	C ₇ H ₁₅ NO	<i>n</i> -Heptylamide C ₆ H ₁₃ CONH ₂	129.12	96			
2386	C ₇ H ₁₅ NO	Heptaldoxime C ₆ H ₁₃ CH:NOH.....	129.12	55.5	195	0.834 ²³	1124
2386.1	C ₇ H ₁₅ NO ₂	Isobutylurethane C ₄ H ₉ NHCO ₂ C ₃ H ₇	145.12	< -65	96 ¹⁷	0.943	311
2387	C ₇ H ₁₆	2, 4-Dimethylpentane CH ₃ [CH(CH ₃) ₂] ₂ ..	100.12		83.9	0.681	45
2388	C ₇ H ₁₆	3, 3-Dimethylpentane.....	100.12		87	0.711 ⁰	
2389	C ₇ H ₁₆	<i>n</i> -Heptane CH ₃ (CH ₂) ₅ CH ₃	100.12	-90.0	98.4	0.684	55
2390	C ₇ H ₁₆	2-Methylhexane (CH ₃) ₂ CHC ₂ H ₅	100.12		90.4	0.707 ²	
2391	C ₇ H ₁₆	<i>d</i> , 3-Methylhexane C ₃ H ₇ CH(CH ₃)C ₂ H ₅ ..	100.12		92	0.687	
2392	C ₇ H ₁₆	3-Ethylpentane (C ₂ H ₅) ₂ CH.....	100.12		93.8	0.670	89
2393	C ₇ H ₁₆	2, 2, 3-Trimethylbutane.....	100.12	-25	80.8	0.695 ¹⁵	77
2394	C ₇ H ₁₆	2, 2-Dimethylpentane (CH ₃) ₂ CC ₂ H ₅	100.12		78.6	0.674	
2396	C ₇ H ₁₆ O	Dimethylbutyl carbinol.....	116.12		142.2	0.816	224
2397	C ₇ H ₁₆ O	Dimethylisobutyl carbinol.....	116.12		130	0.816	228
2398	C ₇ H ₁₆ O	Dimethyl- <i>tert</i> .-butyl carbinol.....	116.12	17	132		
2399	C ₇ H ₁₆ O	Dipropyl carbinol (C ₃ H ₇) ₂ CHOH.....	116.12		155.4	0.820	256
2400	C ₇ H ₁₆ O	Diisopropyl carbinol.....	116.12		140	0.829	265
2400.1	C ₇ H ₁₆ O	<i>d</i> -Ethylbutyl carbinol.....	116.12		66 ¹⁸	0.823	251
2401	C ₇ H ₁₆ O	Ethylisobutyl carbinol.....	116.12		148.2		
2402	C ₇ H ₁₆ O	Ethyl- <i>sec</i> .-butyl carbinol.....	116.12		150	0.852 ⁰	
2403	C ₇ H ₁₆ O	<i>n</i> -Heptyl alcohol C ₇ H ₁₅ OH.....	116.12	-34.6	175.8	0.817 ²²	287
2404	C ₇ H ₁₆ O	2-Hydroxy-3-ethylpentane.....	116.12		152	0.853 ⁰	
2405	C ₇ H ₁₆ O	1-Hydroxy-2-methylhexane.....	116.12		162.5	0.831 ¹⁹	266
2406	C ₇ H ₁₆ O	Isoheptyl alcohol.....	116.12		167.2	0.831 ⁰	291
2407	C ₇ H ₁₆ O	Methyl- <i>n</i> -amyl carbinol.....	116.12		158	0.819	259
2407.1	C ₇ H ₁₆ O	<i>d</i> -Methylamyl carbinol.....	116.12		73.5 ²⁰	0.819	253
2408	C ₇ H ₁₆ O	Methylisoamyl carbinol.....	116.12		150	0.819 ^{17.8}	
2409	C ₇ H ₁₆ O	Methylethylpropyl carbinol.....	116.12		141	0.823	270
2410	C ₇ H ₁₆ O	Methylethylisopropyl carbinol.....	116.12		140	0.833	
2411	C ₇ H ₁₆ O	Propylisopropyl carbinol.....	116.12		141	0.821 ¹⁷	215
2412	C ₇ H ₁₆ O	Triethyl carbinol (C ₂ H ₅) ₃ COH.....	116.12		142	0.840	334
2413	C ₇ H ₁₆ O	Ethyl isoamyl ether.....	116.12		112	0.764 ¹⁸	
2414	C ₇ H ₁₆ O	Propyl butyl ether C ₃ H ₇ OC ₂ H ₅	116.12		117.1	0.777 ⁰	
2415	C ₇ H ₁₆ O ₂	Ethyl orthoformate HC(OC ₂ H ₅) ₂	148.12	-76.1	145.9	0.897	
2416	C ₇ H ₁₅ O ₂ S ₂	Sulfonal (CH ₃) ₂ C(SO ₂ C ₂ H ₅) ₂	228.25	128	300 d.		
2417	C ₇ H ₁₅ O ₇	<i>d</i> -Mannoheptitol.....	212.12	188			
2418	C ₇ H ₁₅ O ₇	Volemitol.....	212.12	155			
2419	C ₇ H ₁₇ N	<i>n</i> -Heptylamine C ₇ H ₁₅ NH ₂	115.14	-23.0	155.1	0.777	278
2420	C ₈ Cl ₂ O ₃	Tetrachloro- <i>o</i> -phthalic anhydride.....	285.83	257			
2421	C ₈ H ₂ Cl ₂ O ₃	3, 6-Dichloro- <i>o</i> -phthalic anhydride.....	216.93	191	339		
2422	C ₈ H ₂ Cl ₄ O ₄	Tetrachloro- <i>o</i> -phthalic acid.....	303.85	250			
2422.1	C ₈ H ₂ BrNO ₂	<i>m</i> -Bromoisatine.....	225.96	255			
2422.2	C ₈ H ₂ ClNO	Isatine chloride.....	165.50	180 d.			
2423	C ₈ H ₄ Cl ₂ O ₂	<i>o</i> -Phthalyl dichloride <i>o</i> -C ₆ H ₄ (COCl) ₂ ...	202.95	0	276.7	1.408	755
2424	C ₈ H ₄ Cl ₂ O ₂	Isophthalyl dichloride <i>m</i> -C ₆ H ₄ (COCl) ₂ ...	202.95	41	276		
2425	C ₈ H ₄ Cl ₂ O ₂	Terephthalyl dichloride <i>p</i> -C ₆ H ₄ (COCl) ₂ ...	202.95	78	259		
2426	C ₈ H ₄ Cl ₂ O ₄	3, 6-Dichloro- <i>o</i> -phthalic acid.....	234.95	185			
2427	C ₈ H ₄ Cl ₄ O	Trichloromethyl <i>p</i> -chlorophenylketone...	257.86	28	181 ⁴⁶		
2428	C ₈ H ₄ N ₂	Isophthalic nitrile <i>m</i> -C ₆ H ₄ (CN) ₂	128.05	161			
2429	C ₈ H ₄ N ₂	Terephthalic nitrile <i>p</i> -C ₆ H ₄ (CN) ₂	128.05	222			
2430	C ₈ H ₄ N ₂ O ₄	Nitroisatine.....	192.05	230			
2431	C ₈ H ₄ O ₃	<i>o</i> -Phthalic anhydride.....	148.03	130.8	284.5	1.527 ⁴	
2432	C ₈ H ₄ Cl ₂ O	Dichloromethyl <i>p</i> -chlorophenyl ketone...	223.41	51	178 ⁴⁶		
2433	C ₈ H ₄ Cl ₄ NO	2, 3, 4, 6-Tetrachloroacetanilide.....	272.88	181			
2434	C ₈ H ₅ NO	Benzoyl cyanide C ₆ H ₅ .COCN.....	131.05	34	208		
2435	C ₈ H ₅ NO ₂	<i>o</i> -Cyanobenzoic acid.....	147.05	190			
2436	C ₈ H ₅ NO ₂	<i>m</i> -Cyanobenzoic acid.....	147.05	217			
2437	C ₈ H ₅ NO ₂	<i>p</i> -Cyanobenzoic acid.....	147.05	214			
2438	C ₈ H ₅ NO ₂	Isatine.....	147.05	201			
2439	C ₈ H ₅ NO ₂	<i>o</i> -Phthalimide <i>o</i> -C ₆ H ₄ (CO) ₂ NH.....	147.05	238			
2440	C ₈ H ₅ NO ₃	3-Nitro- <i>o</i> -phthalic acid.....	211.05	220			
2441	C ₈ H ₅ NO ₃	4-Nitro- <i>o</i> -phthalic acid.....	211.05	164			
2442	C ₈ H ₅ NO ₃	2-Nitroisophthalic acid.....	211.05	300			
2443	C ₈ H ₅ NO ₃	4-Nitroisophthalic acid.....	211.05	245			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2444	C ₈ H ₆ NO ₄	5-Nitroisophthalic acid.....	211.05	255			
2445	C ₈ H ₆ NO ₄	2-Nitroterephthalic acid.....	211.05	270			
2446	C ₈ H ₆ NO ₄	Pyridine-2, 3, 4-tricarboxylic acid.....	211.05	250 d.			
2447	C ₈ H ₆ NO ₄	Pyridine 2, 3, 5-tricarboxylic acid.....	211.05	323			
2448	C ₈ H ₆ NO ₄	Pyridine-2, 3, 6-tricarboxylic acid.....	211.05	100			
2449	C ₈ H ₆ NO ₄	Pyridine-2, 4, 5-tricarboxylic acid.....	211.05	235			
2450	C ₈ H ₆ NO ₄	Pyridine-2, 4, 6-tricarboxylic acid.....	211.05	227			
2451	C ₈ H ₆ NO ₄	Pyridine-3, 4, 5-tricarboxylic acid.....	211.05	261			
2452	C ₈ H ₈ N ₂ O ₄	Picryl acetate.....	271.06	76	120 d.		
2453	C ₈ H ₆	Phenylacetylene C ₈ H ₆ C≡CH.....	102.05		143	0.930	820
2454	C ₈ H ₆ BrN	Bromobenzyl cyanide C ₈ H ₆ CHBrCN...	195.97	> -17	231.7	1.519	1185
2455	C ₈ H ₆ Br ₂	Styrene-1, 2-dibromide.....	261.88	73.5	134 ¹⁵		
2456	C ₈ H ₆ Br ₂ O	<i>p</i> -Bromophenacyl bromide.....	277.88	109.7			
2457	C ₈ H ₆ Cl ₂ O ₂	Piperonal chloride.....	204.96		240 s. d.		
2458	C ₈ H ₆ Cl ₂ NO	2, 3, 4-Trichloroacetanilide.....	238.43	122			
2459	C ₈ H ₆ Cl ₂ NO	2, 4, 5-Trichloroacetanilide.....	238.43	190			
2460	C ₈ H ₆ Cl ₂ NO	2, 4, 6-Trichloroacetanilide.....	238.43	204			
2461	C ₈ H ₆ I ₂ O ₂	Methyl 3, 5-diiodosalicylate.....	403.91	110.5			
2462	C ₈ H ₆ N ₂	Phthalazine.....	130.06	91	317		
2463	C ₈ H ₆ N ₂	Quinazoline.....	130.06	48	243		
2464	C ₈ H ₆ N ₂	Quinoxaline.....	130.06	30.5	226	1.133 ⁴⁸	1075
2465	C ₈ H ₆ N ₂ O ₂	Isatoxime (Nitrosooxindol).....	162.06	202			
2466	C ₈ H ₆ N ₂ O ₂	<i>p</i> -Nitrobenzyl cyanide.....	162.06	117			
2467	C ₈ H ₆ N ₄ O ₂	Alloxantin.....	286.08	170 d.			
2468	C ₈ H ₆ O	Coumarone.....	118.05	> -18	175	1.091	997
2469	C ₈ H ₆ O ₂	Phenylglyoxal C ₈ H ₆ CO.CHO.....	134.05	73	142 ¹²⁵		
2470	C ₈ H ₆ O ₂	<i>o</i> -Phthalic aldehyde <i>o</i> -C ₆ H ₄ (CHO) ₂ ...	134.05	56			
2471	C ₈ H ₆ O ₂	Isophthalic aldehyde <i>m</i> -C ₆ H ₄ (CHO) ₂ ...	134.05	89.5			
2472	C ₈ H ₆ O ₂	Terephthalic aldehyde <i>p</i> -C ₆ H ₄ (CHO) ₂ ...	134.05	116	248		
2473	C ₈ H ₆ O ₂	Phthalide.....	134.05	73; 65	290		
2474	C ₈ H ₆ O ₂	Piperonal (Heliotropin).....	150.05	37	263		
2475	C ₈ H ₆ O ₂	<i>o</i> -Aldehydobenzoic acid.....	150.05	100.5		1.404	
2476	C ₈ H ₆ O ₂	<i>m</i> -Aldehydobenzoic acid.....	150.05	175			
2477	C ₈ H ₆ O ₂	<i>p</i> -Aldehydobenzoic acid.....	150.05	250			
2478	C ₈ H ₆ O ₂	Phenylglyoxylic acid.....	150.05	66	148 ⁶		
2479	C ₈ H ₆ O ₄	<i>o</i> -Phthalic acid <i>o</i> -C ₆ H ₄ (CO ₂ H) ₂ ...	166.05	191 d.		1.593	
2480	C ₈ H ₆ O ₄	Isophthalic acid <i>m</i> -C ₆ H ₄ (CO ₂ H) ₂ ...	166.05	330			
2482	C ₈ H ₆ O ₄	Piperonylic acid CH ₂ :O ₂ :C ₆ H ₃ CO ₂ H...	166.05	228			
2483	C ₈ H ₆ O ₄	2-Hydroxy- <i>o</i> -phthalic acid.....	182.05	244			
2485	C ₈ H ₆ O ₄	4-Hydroxy- <i>o</i> -phthalic acid.....	182.05	181 d.			
2486	C ₈ H ₆ O ₄	2-Hydroxyisophthalic acid.....	182.05	239			
2487	C ₈ H ₆ O ₄	4-Hydroxyisophthalic acid.....	182.05	306			
2488	C ₈ H ₆ O ₄	5-Hydroxyisophthalic acid.....	182.05	288			
2489	C ₈ H ₆ O ₄	Noropianic acid.....	182.05	171			
2490	C ₈ H ₆ S	Thionaphthene.....	134.11	32	221	1.165	1049
2491	C ₈ H ₇ Br	α -Bromostyrene C ₈ H ₇ CHBrCH ₃	182.97	-43.5	160 ⁷⁶	1.4057	770
2492	C ₈ H ₇ Br	ω -Bromostyrene (isomer 1).....	182.97	7	221	1.4224	786
2493	C ₈ H ₇ Br	ω -Bromostyrene (isomer 2).....	182.97	-7.5	108 ²⁶	1.427	992
2493.1	C ₈ H ₇ BrN ₂ O ₂	α -Bromonitroacetanilide.....	258.99	131		1.765	
2494	C ₈ H ₇ BrO	ω -Bromoacetophenone.....	198.97	50	119	1.647	
2495	C ₈ H ₇ Cl	α -Chlorostyrene C ₈ H ₇ C(Cl)CH ₃	138.51		199		
2496	C ₈ H ₇ Cl	ω -Chlorostyrene C ₈ H ₇ CH(Cl)CH ₃	138.51		198.8	1.112 ²⁸	
2497	C ₈ H ₇ ClO	ω -Chloroacetophenone.....	154.51	59	247	1.324 ¹⁶	
2498	C ₈ H ₇ ClO	<i>p</i> -Chloroacetophenone.....	154.51	20	232	1.188	
2499	C ₈ H ₇ ClO	Phenylacetyl chloride C ₈ H ₇ CH ₂ COCl...	154.51		102.5 ¹⁷	1.168	
2500	C ₈ H ₇ ClO ₂	<i>p</i> -Anisyl chloride <i>p</i> -CH ₃ OC ₆ H ₄ COCl...	170.51	27			
2501	C ₈ H ₇ ClO ₂	Phenyl chloroacetate ClCH ₂ CO ₂ C ₆ H ₅ ...	170.51	45	235		
2502	C ₈ H ₇ F ₂ NO	2, 5-Difluoroacetanilide.....	171.06	122.5			
2503	C ₈ H ₇ N	Benzyl cyanide C ₈ H ₇ CH ₂ CN.....	117.06	-23.8	233.9	1.015 ¹⁸	679
2504	C ₈ H ₇ N	Indole.....	117.06	52.5	254		1333
2505	C ₈ H ₇ N	<i>o</i> -Tolunitrile <i>o</i> -CH ₃ C ₆ H ₄ CN.....	117.06		204	0.995 ²⁵	1004
2506	C ₈ H ₇ N	<i>m</i> -Tolunitrile <i>m</i> -CH ₃ C ₆ H ₄ CN.....	117.06		214	0.984 ²⁵	
2507	C ₈ H ₇ N	<i>p</i> -Tolunitrile <i>p</i> -CH ₃ C ₆ H ₄ CN.....	117.06	29.5	217		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2508	C ₈ H ₇ NO	<i>p</i> -Anisonitrile <i>p</i> -CH ₃ OC ₆ H ₄ CN.....	133.06	60	256		
2509	C ₈ H ₇ NO	<i>dl</i> -Mandelonitrile C ₈ H ₇ CH(OH)CN....	133.06	-10	d.	1.124	
2510	C ₈ H ₇ NO	Indoxyl.....	133.06	85	110		
2511	C ₈ H ₇ NO	Oxindol.....	133.06	120			
2512	C ₈ H ₇ NO ₂	Hydrindic acid (Dioxindol).....	149.06	180	195 d.		
2513	C ₈ H ₇ NO ₂	<i>o</i> -Nitrostyrene <i>o</i> -NO ₂ .C ₆ H ₄ .CH:CH ₂ ...	149.06	13.5			
2514	C ₈ H ₇ NO ₂	<i>m</i> -Nitrostyrene <i>m</i> -NO ₂ .C ₆ H ₄ .CH:CH ₂ ...	149.06	-5			
2515	C ₈ H ₇ NO ₂	<i>p</i> -Nitrostyrene <i>p</i> -NO ₂ .C ₆ H ₄ .CH:CH ₂ ...	149.06	29			
2516	C ₈ H ₇ NO ₃	Oxanilic acid CO ₂ H.CONHC ₆ H ₄	165.06	150			
2517	C ₈ H ₇ NO ₃	<i>o</i> -Phthalamic acid.....	165.06	149	155 d.		
2518	C ₈ H ₇ NO ₄	Methyl <i>o</i> -nitrobenzoate.....	181.06	-8	269	1.284 ₂₅	
2519	C ₈ H ₇ NO ₄	Methyl <i>m</i> -nitrobenzoate.....	181.06	70	279		
2520	C ₈ H ₇ NO ₄	Methyl <i>p</i> -nitrobenzoate.....	181.06	96			
2521	C ₈ H ₇ NO ₄	Uvitonic acid.....	181.06	274			
2522	C ₈ H ₇ NS	Benzyl isothiocyanate.....	149.13		243		
2522.1	C ₈ H ₇ NS	Benzyl thiocyanate.....	149.13	41	235		
2523	C ₈ H ₇ NS	<i>o</i> -Tolyl isothiocyanate.....	149.13		239	1.104 ₂₅	
2524	C ₈ H ₇ NS	<i>m</i> -Tolyl isothiocyanate.....	149.13		245		
2525	C ₈ H ₇ NS	<i>p</i> -Tolyl isothiocyanate.....	149.13	26	237	1.087 ₂₅	
2526	C ₈ H ₇ N ₂ O ₅	2, 3-Dinitroacetanilide.....	225.08	186			
2527	C ₈ H ₇ N ₂ O ₅	2, 4-Dinitroacetanilide.....	225.08	120			
2528	C ₈ H ₇ N ₂ O ₅	2, 6-Dinitroacetanilide.....	225.08	197			
2529	C ₈ H ₇ N ₂ O ₅	3, 4-Dinitroacetanilide.....	225.08	144			
2530	C ₈ H ₇ N ₂ O ₅	3, 6-Dinitroacetanilide.....	225.08	121			
2531	C ₈ H ₇ N ₂ O ₆	3, 4, 5-Trinitro- <i>o</i> -xylene.....	241.08	115			
2532	C ₈ H ₇ N ₂ O ₆	3, 4, 6-Trinitro- <i>o</i> -xylene.....	241.08	72			
2533	C ₈ H ₇ N ₂ O ₆	2, 4, 5-Trinitro- <i>m</i> -xylene.....	241.08	90			
2534	C ₈ H ₇ N ₂ O ₆	2, 4, 6-Trinitro- <i>m</i> -xylene.....	241.08	181.5			
2535	C ₈ H ₇ N ₂ O ₆	4, 5, 6-Trinitro- <i>m</i> -xylene.....	241.08	125			
2536	C ₈ H ₇ N ₂ O ₆	2, 3, 6-Trinitro- <i>p</i> -xylene.....	241.08	140 ³⁰			
2537	C ₈ H ₇ N ₂ O ₇	Ethyl picrate.....	257.08	78.5			
2538	C ₈ H ₈	Styrene (Phenylethylene).....	104.06		146	0.903	907
2539	C ₈ H ₈ BrNO	<i>o</i> -Bromoacetanilide.....	213.99	99			
2540	C ₈ H ₈ BrNO	<i>p</i> -Bromoacetanilide.....	213.99	165			
2540.1	C ₈ H ₈ Br ₂	<i>o</i> -Xylenedibromide <i>o</i> -C ₆ H ₄ (CH ₂ Br) ₂ ...	263.89	94.5	d.	1.988	
2540.2	C ₈ H ₈ Br ₂	<i>m</i> -Xylenedibromide <i>m</i> -C ₆ H ₄ (CH ₂ Br) ₂ ...	263.89	77	140	1.959	
2541	C ₈ H ₈ Br ₂	<i>p</i> -Xylenedibromide <i>p</i> -C ₆ H ₄ (CH ₂ Br) ₂ ...	263.89	144	245	2.102 ⁹	
2542	C ₈ H ₈ ClNO	<i>o</i> -Chloroacetanilide.....	169.53	88			
2543	C ₈ H ₈ ClNO	<i>m</i> -Chloroacetanilide.....	169.53	72.5			
2544	C ₈ H ₈ ClNO	<i>p</i> -Chloroacetanilide.....	169.53	172.5			
2544.1	C ₈ H ₈ Cl ₂	<i>o</i> -Xylenedichloride <i>o</i> -C ₆ H ₄ (CH ₂ Cl) ₂ ...	174.98	55	241	1.393	
2544.2	C ₈ H ₈ Cl ₂	<i>m</i> -Xylenedichloride <i>m</i> -C ₆ H ₄ (CH ₂ Cl) ₂ ...	174.98	34.2	255	1.302	
2545	C ₈ H ₈ Cl ₂	<i>p</i> -Xylenedichloride <i>p</i> -C ₆ H ₄ (CH ₂ Cl) ₂ ...	174.98	100.5	120 ³⁰	1.417 ⁹	
2546	C ₈ H ₈ INO	<i>p</i> -Iodoacetanilide <i>p</i> -CH ₃ CONHC ₆ H ₄ I..	261.00	184			
2547	C ₈ H ₈ N ₂	Apoharmine.....	132.08	183			
2548	C ₈ H ₈ N ₂	1-Methylindazole.....	132.08		107 ¹⁵	1.032 ₄ ^{9.1}	1129
2549	C ₈ H ₈ N ₂ OS	Benzoylthiourea C ₆ H ₅ CONHC(SNH ₂)...	180.14	169			
2550	C ₈ H ₈ N ₂ O ₂	Benzoylurea C ₆ H ₅ CONHCONH ₂	164.08	200			
2551	C ₈ H ₈ N ₂ O ₂	<i>o</i> -Phthalic diamide <i>o</i> -C ₆ H ₄ (CONH ₂) ₂ ...	164.08	220			
2552	C ₈ H ₈ N ₂ O ₂	Isophthalic diamide <i>m</i> -C ₆ H ₄ (CONH ₂) ₂ ...	164.08	265			
2553	C ₈ H ₈ N ₂ O ₂	<i>N</i> -Nitrosoacetanilide.....	164.08	41			
2554	C ₈ H ₈ N ₂ O ₂	Ricinine.....	164.08	201			
2555	C ₈ H ₈ N ₂ O ₂	<i>o</i> -Nitroacetanilide.....	180.08	93			
2556	C ₈ H ₈ N ₂ O ₂	<i>m</i> -Nitroacetanilide.....	180.08	150.5			
2557	C ₈ H ₈ N ₂ O ₂	<i>p</i> -Nitroacetanilide.....	180.08	214			
2558	C ₈ H ₈ N ₂ O ₄	3, 4-Dinitro- <i>o</i> -xylene.....	196.08	82			
2559	C ₈ H ₈ N ₂ O ₄	3, 6-Dinitro- <i>o</i> -xylene.....	196.08	56			
2560	C ₈ H ₈ N ₂ O ₄	4, 5-Dinitro- <i>o</i> -xylene.....	196.08	115			
2561	C ₈ H ₈ N ₂ O ₄	4, 6-Dinitro- <i>o</i> -xylene.....	196.08	75			
2562	C ₈ H ₈ N ₂ O ₄	2, 5-Dinitro- <i>m</i> -xylene.....	196.08	101			
2563	C ₈ H ₈ N ₂ O ₄	4, 5-Dinitro- <i>m</i> -xylene.....	196.08	132			
2564	C ₈ H ₈ N ₂ O ₄	2, 3-Dinitro- <i>p</i> -xylene.....	196.08	93			
2565	C ₈ H ₈ N ₂ O ₄	2, 5-Dinitro- <i>p</i> -xylene.....	196.08	147			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2566	$C_8H_8N_2O_4$	2, 6-Dinitro- <i>p</i> -xylene.....	196.08	124			
2566.1	$C_8H_8N_2O_6$	4, 5-Dinitro-1, 2-dimethoxybenzene.....	228.08	130.5		1.326 ¹³¹	
2566.2	$C_8H_8N_4O$	4-Methoxyphenyltetrazole.....	128.09	228			1306
2567	C_8H_8O	Phenylacetaldehyde $C_6H_5CH_2CHO$	120.06		194	1.027	
2568	C_8H_8O	<i>o</i> -Toluic aldehyde $o-CH_3C_6H_4CHO$	120.06		195.5	1.039	960
2569	C_8H_8O	<i>m</i> -Toluic aldehyde $m-CH_3C_6H_4CHO$	120.06		195.5	1.019	971
2570	C_8H_8O	<i>p</i> -Toluic aldehyde $p-CH_3C_6H_4CHO$	120.06		204	1.020	814; 906
2571	C_8H_8O	Acetophenone $CH_3COC_6H_5$	120.06	19.7	202.3	1.026	705
2572	C_8H_8O	Coumarane.....	120.06		189.5	1.074	
2573	$C_8H_8O_2$	Phenacyl alcohol $C_6H_5COCH_2OH$	136.06	86		1.013	
2574	$C_8H_8O_2$	5-Hydroxytoluene-2-aldehyde.....	136.06	108.9			
2575	$C_8H_8O_2$	4-Hydroxytoluene-3-aldehyde.....	136.06	55.1	21.8		
2576	$C_8H_8O_2$	6-Hydroxytoluene-3-aldehyde.....	136.06	117.4			
2577	$C_8H_8O_2$	3-Hydroxytoluene-4-aldehyde.....	136.06	54	223		
2578	$C_8H_8O_2$	<i>o</i> -Methoxybenzaldehyde.....	136.06	35	242	1.133	745
2579	$C_8H_8O_2$	<i>m</i> -Methoxybenzaldehyde.....	136.06		230	1.118	836
2580	$C_8H_8O_2$	<i>p</i> -Methoxybenzaldehyde.....	136.06	2.5	247	1.123	821
2581	$C_8H_8O_2$	<i>o</i> -Hydroxyacetophenone.....	136.06		213		
2582	$C_8H_8O_2$	<i>m</i> -Hydroxyacetophenone.....	136.06	95			
2583	$C_8H_8O_2$	<i>p</i> -Hydroxyacetophenone.....	136.06	109			
2584	$C_8H_8O_2$	Phenylacetic acid $C_6H_5CH_2CO_2H$	136.06	76.7	265.5	1.078 ⁸³	
2585	$C_8H_8O_2$	<i>o</i> -Toluic acid $o-CH_3C_6H_4CO_2H$	136.06	102.4	259.2	1.062 ^{114,6}	1157
2586	$C_8H_8O_2$	<i>m</i> -Toluic acid $m-CH_3C_6H_4CO_2H$	136.06	110.5	263	1.054 ^{111,6}	640
2587	$C_8H_8O_2$	<i>p</i> -Toluic acid $p-CH_3C_6H_4CO_2H$	136.06	176.8	275		
2588	$C_8H_8O_2$	Benzyl formate $HCO_2CH_2C_6H_5$	136.06		203.4	1.081	
2589	$C_8H_8O_2$	Methyl benzoate $C_6H_5CO_2CH_3$	136.06	-12.5	199.6	1.094	656
2590	$C_8H_8O_2$	Phenyl acetate $CH_3CO_2C_6H_5$	136.06		195.5	1.078	610
2591	$C_8H_8O_2$	<i>o</i> -Xyloquinone 1, 2-(CH_3) ₂ C ₆ H ₂ O ₂ -3, 6..	136.06	55			
2592	$C_8H_8O_2$	<i>m</i> -Xyloquinone 1, 3-(CH_3) ₂ C ₆ H ₂ O ₂ -2, 5..	136.06	73			
2593	$C_8H_8O_2$	<i>p</i> -Xyloquinone 1, 4-(CH_3) ₂ C ₆ H ₂ O ₂ -2, 5..	136.06	125			
2594	$C_8H_8O_2$	Piperonyl alcohol.....	152.06	51			
2595	$C_8H_8O_2$	Isovanillin 4, 3- $CH_2OC_6H_3(OH)CHO$	152.06	116		1.196	
2596	$C_8H_8O_2$	Vanillin 3, 4- $CH_2OC_6H_3(OH)CHO$	152.06	81	285		
2597	$C_8H_8O_2$	<i>o</i> -Hydroxymethylbenzoic acid.....	152.06	120			
2598	$C_8H_8O_2$	<i>m</i> -Hydroxymethylbenzoic acid.....	152.06	111	190 ¹¹		
2599	$C_8H_8O_2$	<i>p</i> -Hydroxymethylbenzoic acid.....	152.06	181			
2600	$C_8H_8O_2$	<i>o</i> -Hydroxyphenylacetic acid.....	152.06	137			
2601	$C_8H_8O_2$	<i>m</i> -Hydroxyphenylacetic acid.....	152.06	129			
2602	$C_8H_8O_2$	<i>p</i> -Hydroxyphenylacetic acid.....	152.06	148			
2603	$C_8H_8O_2$	3-Hydroxytoluene-2-carboxylic acid.....	152.06	167			
2604	$C_8H_8O_2$	4-Hydroxytoluene-2-carboxylic acid.....	152.06	172.4			
2605	$C_8H_8O_2$	5-Hydroxytoluene-2-carboxylic acid.....	152.06	178			
2606	$C_8H_8O_2$	6-Hydroxytoluene-2-carboxylic acid.....	152.06	183			
2607	$C_8H_8O_2$	4-Hydroxytoluene-3-carboxylic acid.....	152.06	152.5			
2608	$C_8H_8O_2$	5-Hydroxytoluene-3-carboxylic acid.....	152.06	208			
2609	$C_8H_8O_2$	6-Hydroxytoluene-3-carboxylic acid.....	152.06	172			
2610	$C_8H_8O_2$	2-Hydroxytoluene-4-carboxylic acid.....	152.06	207			
2611	$C_8H_8O_2$	3-Hydroxytoluene-4-carboxylic acid.....	152.06	177.8			
2612	$C_8H_8O_2$	<i>d</i> (<i>l</i>)-Mandelic acid $C_6H_5CH(OH)CO_2H$	152.06	133			
2613	$C_8H_8O_2$	<i>dl</i> -Mandelic acid $C_6H_5CH(OH)CO_2H$	152.06	118		1.361 ⁴	
2614	$C_8H_8O_2$	<i>o</i> -Methoxybenzoic acid.....	152.06	98	200		
2615	$C_8H_8O_2$	<i>m</i> -Methoxybenzoic acid.....	152.06	100			
2616	$C_8H_8O_2$	<i>p</i> -Methoxybenzoic acid.....	152.06	184.2	280	1.385 ⁴	1333
2617	$C_8H_8O_2$	Phenoxyacetic acid $C_6H_5OCH_2CO_2H$	152.06	99	285 s. d.		
2618	$C_8H_8O_2$	Methyl salicylate $HOC_6H_4CO_2CH_3$	152.06	-8.6	223.3	1.184	708
2619	$C_8H_8O_2$	Resorcinol acetate.....	152.06		283		
2620	$C_8H_8O_4$	Phloracetophenone.....	168.06	285			
2621	$C_8H_8O_4$	Berberonic acid 2, 4, 5- $C_6H_3N(CO_2H)_3$	168.06	165			
2622	$C_8H_8O_4$	Dehydracetic acid.....	168.06	109	270		
2623	$C_8H_8O_4$	$\Delta^1, 4$ -Dihydro- <i>o</i> -phthalic acid.....	168.06	153			
2624	$C_8H_8O_4$	$\Delta^2, 4$ -Dihydro- <i>o</i> -phthalic acid.....	168.06	215			
2625	$C_8H_8O_4$	$\Delta^3, 4$ -Dihydro- <i>o</i> -phthalic acid.....	168.06	215			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2626	C ₈ H ₈ O ₄	Homogentisinic acid.....	168.06	147			
2627	C ₈ H ₈ O ₄	Isovanillic acid.....	168.06	250			
2628	C ₈ H ₈ O ₄	Vanillic acid.....	168.06	207			
2630	C ₈ H ₈ O ₆	Methyl gallate.....	184.06	192 d.			
2631	C ₈ H ₈ O ₈	Tetramethylene-1, 1, 2, 2-tetracarboxylic acid.....	232.06	203			
2632	C ₈ H ₈ Br	<i>o</i> -Xylyl bromide.....	184.99	21	217.7	1.381 ²³	740
2633	C ₈ H ₈ Br	4-Bromo- <i>o</i> -xylene.....	184.99	0.2	214.5	1.369	
2634	C ₈ H ₈ Br	<i>m</i> -Xylyl bromide.....	184.99		215.8 s. d.	1.371 ²³	
2635	C ₈ H ₈ Br	2-Bromo- <i>m</i> -xylene.....	184.99	> -10	206		
2636	C ₈ H ₈ Br	4-Bromo- <i>m</i> -xylene.....	184.99		207		735
2637	C ₈ H ₈ Br	5-Bromo- <i>m</i> -xylene.....	184.99	> -20	204	1.362	
2638	C ₈ H ₈ Br	<i>p</i> -Xylyl bromide.....	184.99	38	220.7	1.324	
2639	C ₈ H ₈ Br	2-Bromo- <i>p</i> -xylene.....	184.99	10	205.7	1.356	
2640	C ₈ H ₈ Cl	<i>o</i> -Xylyl chloride.....	140.53		199		
2641	C ₈ H ₈ Cl	3-Chloro- <i>o</i> -xylene.....	140.53	> -20	189.5		
2642	C ₈ H ₈ Cl	4-Chloro- <i>o</i> -xylene.....	140.53	> -20	191.5	1.0692 ¹⁴	
2643	C ₈ H ₈ Cl	<i>m</i> -Xylyl chloride.....	140.53		196		
2644	C ₈ H ₈ Cl	<i>p</i> -Xylyl chloride.....	140.53		202		
2645	C ₈ H ₈ N	2-Allylpyridine.....	119.08		190	0.959 ⁹	
2646	C ₈ H ₈ NO	<i>o</i> -Aminoacetophenone.....	135.08		252 s. d.		
2647	C ₈ H ₈ NO	<i>m</i> -Aminoacetophenone.....	135.08	96.5	290		
2648	C ₈ H ₈ NO	<i>p</i> -Aminoacetophenone.....	135.08	106	295		
2649	C ₈ H ₈ NO	Acetanilide (Antifebrin).....	135.08	114.2	303.8	1.21 ⁴	
2650	C ₈ H ₈ NO	Acetophenoneoxime CH ₃ C(:NOH)C ₆ H ₅	135.08	58			
2651	C ₈ H ₈ NO	Phenylacetamide C ₆ H ₅ CH ₂ CONH ₂	135.08	155	284		
2652	C ₈ H ₈ NO	<i>o</i> -Toluic amide <i>o</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	138			
2653	C ₈ H ₈ NO	<i>m</i> -Toluic amide <i>m</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	97			
2654	C ₈ H ₈ NO	<i>p</i> -Toluic amide <i>p</i> -CH ₃ C ₆ H ₄ CONH ₂	135.08	159			
2655	C ₈ H ₈ NO ₂	<i>o</i> -Acetoaminophenol.....	151.08	203			
2656	C ₈ H ₈ NO ₂	<i>m</i> -Acetoaminophenol.....	151.08	149			
2657	C ₈ H ₈ NO ₂	<i>p</i> -Acetoaminophenol.....	151.08	168			
2658	C ₈ H ₈ NO ₂	<i>dl</i> -Aminophenylacetic acid.....	151.08	256	265		
2659	C ₈ H ₈ NO ₂	Homoanthranilic acid.....	151.08	177 d.			
2660	C ₈ H ₈ NO ₂	<i>N</i> -Methylanthranilic acid.....	151.08	179			
2661	C ₈ H ₈ NO ₂	<i>dl</i> -Phenylaminoacetic acid.....	151.08	127			
2662	C ₈ H ₈ NO ₂	Benzyl carbamate C ₆ H ₅ CH ₂ CO ₂ NH ₂	151.08	86			
2663	C ₈ H ₈ NO ₂	Ethyl nicotinate.....	151.08		105 ⁵		
2664	C ₈ H ₈ NO ₂	Methyl <i>o</i> -aminobenzoate.....	151.08	8.2; 24.3	135.5 ¹⁵	1.168 ¹⁵	
2665	C ₈ H ₈ NO ₂	Methyl <i>p</i> -aminobenzoate.....	151.08	112			
2666	C ₈ H ₈ NO ₂	3-Nitro- <i>o</i> -xylene.....	151.08		250.8	1.147 ¹⁵	
2667	C ₈ H ₈ NO ₂	4-Nitro- <i>o</i> -xylene.....	151.08	30	258	1.139 ²⁰	
2668	C ₈ H ₈ NO ₂	2-Nitro- <i>m</i> -xylene.....	151.08		225.5	1.112 ¹⁵	
2669	C ₈ H ₈ NO ₂	4-Nitro- <i>m</i> -xylene.....	151.08	2	246	1.126 ^{17, 8}	
2670	C ₈ H ₈ NO ₂	5-Nitro- <i>m</i> -xylene.....	151.08	71	273.7		
2671	C ₈ H ₈ NO ₂	2-Nitro- <i>p</i> -xylene.....	151.08		239.9	1.132 ¹⁵	
2672	C ₈ H ₈ NO ₂	α -Anisaldoxime CH ₃ OC ₆ H ₄ CH:NOH.....	151.08	64			
2673	C ₈ H ₈ NO ₂	β -Anisaldoxime CH ₃ OC ₆ H ₄ CH:NOH.....	151.08	133			
2674	C ₈ H ₈ NO ₂	<i>o</i> -Methoxybenzamide.....	151.08	129			
2675	C ₈ H ₈ NO ₂	<i>p</i> -Methoxybenzamide.....	151.08	162.3			
2676	C ₈ H ₈ NO ₂	3-Nitro-4-methoxytoluene.....	167.08	8.5	274 d.		
2677	C ₈ H ₈ NO ₂	<i>o</i> -Nitrophenetol <i>o</i> -C ₆ H ₄ OC ₂ H ₄ NO ₂	167.08		268	1.190 ¹⁵	718
2678	C ₈ H ₈ NO ₂	<i>p</i> -Nitrophenetol <i>p</i> -C ₆ H ₄ OC ₂ H ₄ NO ₂	167.08	60	283		
2679	C ₈ H ₈ NO ₂	Methyl 3-hydroxy-4-aminobenzoate.....	167.08	120			
2680	C ₈ H ₈ NO ₂	Methyl 3-amino-4-hydroxybenzoate.....	167.08	143			
2681	C ₈ H ₈ NO ₄	Biliverdic acid.....	183.08	114			
2682	C ₈ H ₈ NS	Thioacetanilide CH ₃ CSNHC ₆ H ₅	151.14	75	d.		
2682.1	C ₈ H ₈ N ₂ O ₄	2, 4-Dinitrodimethylaniline.....	221.09	87		1.476	
2683	C ₈ H ₁₀	Ethylbenzene C ₆ H ₅ CH ₂ CH ₃	106.08	-92.8	136.5 ^{7, 7}	0.868	577
2684	C ₈ H ₁₀	<i>o</i> -Xylene <i>o</i> -C ₆ H ₄ (CH ₃) ₂	106.08	-27.1	144	0.879	626
2685	C ₈ H ₁₀	<i>m</i> -Xylene <i>m</i> -C ₆ H ₄ (CH ₃) ₂	106.08	-53.6	139.0	0.865	584
2686	C ₈ H ₁₀	<i>p</i> -Xylene <i>p</i> -C ₆ H ₄ (CH ₃) ₂	106.08	13.2	137.7	0.861	573
2687	C ₈ H ₁₀ ClN	<i>o</i> -Chlorodimethylaniline.....	155.54		208.5	1.107	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2688	C ₈ H ₁₀ ClN	<i>p</i> -Chlorodimethylaniline.....	155.54	35.5	231		
2689	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>o</i> -phenylenediamine.....	150.09	144.8			
2690	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>m</i> -phenylenediamine.....	150.09	279			
2691	C ₈ H ₁₀ N ₂ O	<i>N</i> -Acetyl- <i>p</i> -phenylenediamine.....	150.09	160.5			
2692	C ₈ H ₁₀ N ₂ O	Benzylurea C ₆ H ₅ CH ₂ NHCONH ₂	150.09	147.5			
2693	C ₈ H ₁₀ N ₂ O	Hydracetone CH ₃ COHN.NHC ₆ H ₅	150.09	128			
2694	C ₈ H ₁₀ N ₂ O	1-Methyl-1-phenylurea.....	150.09	82			
2695	C ₈ H ₁₀ N ₂ O	<i>p</i> -Nitrosodimethylaniline.....	150.09	85			
2696	C ₈ H ₁₀ N ₂ O ₂	<i>o</i> -Nitrodimeylaniline.....	166.09		154 ³⁴	1.179	
2697	C ₈ H ₁₀ N ₂ O ₂	<i>m</i> -Nitrodimeylaniline.....	166.09	66	285	1.313 ¹⁷	
2698	C ₈ H ₁₀ N ₂ O ₂	<i>p</i> -Nitrodimeylaniline.....	166.09	163			
2699	C ₈ H ₁₀ N ₂ O ₂	3-Amino-4-methoxy-6-nitrotoluene.....	182.09	131.5			
2700	C ₈ H ₁₀ N ₂ S	Benzylthiourea C ₆ H ₅ CH ₂ NHCSNH ₂ ...	166.16	162			
2701	C ₈ H ₁₀ N ₄ O ₂	Caffeine (Theine).....	194.11	237		1.23	
2702	C ₈ H ₁₀ N ₄ O ₂	1, 3, 9-Trimethyluric acid.....	210.11	320 d.			
2703	C ₈ H ₁₀ N ₄ O ₂	1, 7, 9-Trimethyluric acid.....	210.11	340			
2704	C ₈ H ₁₀ N ₄ O ₂	2, 7, 9-Trimethyluric acid.....	210.11	380			
2705	C ₈ H ₁₀ O	2, 3-Dimethylphenol.....	122.08	75	218		
2706	C ₈ H ₁₀ O	2, 4-Dimethylphenol.....	122.08	26	211.5	1.036	
2707	C ₈ H ₁₀ O	2, 6-Dimethylphenol.....	122.08	49	212		
2708	C ₈ H ₁₀ O	3, 4-Dimethylphenol.....	122.08	65	225.1		
2709	C ₈ H ₁₀ O	3, 5-Dimethylphenol.....	122.08	68	219.5		
2710	C ₈ H ₁₀ O	<i>o</i> -Ethylphenol.....	122.08	> -18	207.5	1.037 ^o	
2711	C ₈ H ₁₀ O	<i>m</i> -Ethylphenol.....	122.08	-4	214	1.025 ^o	
2712	C ₈ H ₁₀ O	<i>p</i> -Ethylphenol.....	122.08	46	219		
2713	C ₈ H ₁₀ O	Methylphenyl carbinol.....	122.08		205	1.003 ²¹	
2713.1	C ₈ H ₁₀ O	<i>d</i> -Methylphenyl carbinol.....	122.08		100 ¹⁸	1.014	668
2714	C ₈ H ₁₀ O	2-Phenylethyl alcohol C ₆ H ₅ CH ₂ CH ₂ OH	122.08		221	1.024 ¹⁵	677
2715	C ₈ H ₁₀ O	<i>o</i> -Tolyl carbinol <i>o</i> -CH ₃ C ₆ H ₄ CH ₂ OH...	122.08	34	223.3	1.023 ¹⁰	
2716	C ₈ H ₁₀ O	<i>m</i> -Tolyl carbinol <i>m</i> -CH ₃ C ₆ H ₄ CH ₂ OH...	122.08	> -20	217	1.036 ^o	
2717	C ₈ H ₁₀ O	<i>p</i> -Tolyl carbinol <i>p</i> -CH ₃ C ₆ H ₄ CH ₂ OH...	122.08	59.5	217		
2718	C ₈ H ₁₀ O	Benzyl methyl ether C ₆ H ₅ CH ₂ OCH ₃ ...	122.08		174	0.987 ²⁰	
2719	C ₈ H ₁₀ O	<i>o</i> -Cresyl methyl ether <i>o</i> -CH ₃ C ₆ H ₄ OCH ₃	122.08		171.3	0.981	619
2720	C ₈ H ₁₀ O	<i>m</i> -Cresyl methyl ether.....	122.08		177.2	0.978 ¹³	627
2721	C ₈ H ₁₀ O	<i>p</i> -Cresyl methyl ether.....	122.08		176.5	0.970	646
2722	C ₈ H ₁₀ O	Phenetol C ₆ H ₅ OC ₂ H ₅	122.08	-30.2	172	0.965	633
2723	C ₈ H ₁₀ O ₂	Anis alcohol <i>p</i> -CH ₃ OC ₆ H ₄ CH ₂ OH.....	138.08	45	258.8	1.109 ²⁶	
2724	C ₈ H ₁₀ O ₂	Caffeol.....	138.08		197		
2725	C ₈ H ₁₀ O ₂	Creosol 3, 4-CH ₃ O(OH)C ₆ H ₃ CH ₃	138.08	5.5	221.8	1.092	709
2726	C ₈ H ₁₀ O ₂	3, 5-Dimethyl- <i>o</i> -dihydroxybenzene.....	138.08	74			
2727	C ₈ H ₁₀ O ₂	4, 5-Dimethyl- <i>o</i> -dihydroxybenzene.....	138.08	82			
2728	C ₈ H ₁₀ O ₂	2, 4-Dimethylresorcinol.....	138.08	150			
2729	C ₈ H ₁₀ O ₂	2, 5-Dimethylresorcinol.....	138.08	163	280		
2730	C ₈ H ₁₀ O ₂	4, 5-Dimethylresorcinol.....	138.08	137			
2731	C ₈ H ₁₀ O ₂	4, 6-Dimethylresorcinol.....	138.08	125	279		
2732	C ₈ H ₁₀ O ₂	2, 3-Dimethylhydroquinone.....	138.08	221 s. d.			
2733	C ₈ H ₁₀ O ₂	2, 5-Dimethylhydroquinone.....	138.08	213			
2734	C ₈ H ₁₀ O ₂	2, 6-Dimethylhydroquinone.....	138.08	151			
2735	C ₈ H ₁₀ O ₂	<i>p</i> -Homosaligenin.....	138.08	105			
2736	C ₈ H ₁₀ O ₂	Styrolene alcohol HOCH ₂ CH ₂ OC ₆ H ₅ ...	138.08	68	274.2		
2737	C ₈ H ₁₀ O ₂	<i>o</i> -Dimethoxybenzene <i>o</i> -C ₆ H ₄ (OCH ₃) ₂ ...	138.08	22.5	206	1.086 ¹⁶	
2738	C ₈ H ₁₀ O ₂	<i>o</i> -Ethoxyphenol <i>o</i> -HOC ₆ H ₄ OC ₂ H ₅	138.08	28	241		
2739	C ₈ H ₁₀ O ₂	Hydroquinone dimethyl ether.....	138.08	56	212.6	1.053 ¹⁴	
2740	C ₈ H ₁₀ O ₂	Hydroquinone monoethyl ether.....	138.08	66	247		
2741	C ₈ H ₁₀ O ₂	Resorcinol dimethyl ether.....	138.08	-55.3	215	1.080 ⁹	
2742	C ₈ H ₁₀ O ₂	Resorcinol monoethyl ether.....	138.08		247		
2743	C ₈ H ₁₀ O ₂ S	Ethylphenylsulfone C ₆ H ₅ SO ₂ C ₂ H ₅	170.14	42	>300	1.010 ²²	
2744	C ₈ H ₁₀ O ₂	3-Methoxy-4-hydroxybenzyl alcohol.....	154.08	115	d.		
2745	C ₈ H ₁₀ O ₂	Crotonic anhydride.....	154.08		247.8	1.040	520
2746	C ₈ H ₁₀ O ₄	Δ ¹ -Tetrahydro- <i>o</i> -phthalic acid.....	170.08	120			
2747	C ₈ H ₁₀ O ₄	Δ ² -Tetrahydro- <i>o</i> -phthalic acid.....	170.08	215			
2748	C ₈ H ₁₀ O ₄	Diallyl oxalate C ₂ O ₄ (C ₂ H ₅) ₂	170.08		217	1.055	
2749	C ₈ H ₁₀ O ₄	Dimethyl muconate (CH:CH.CO ₂ CH ₃) ₂	170.08	75 u.; 156 st.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2750	C ₈ H ₁₀ O ₂	Succinic peroxide.....	234.08	127 d.			
2751	C ₈ H ₁₁ BrN ₄ O ₂	Caffeine hydrobromide.....	275.03				1333
2752	C ₈ H ₁₁ ClN ₂ O	<i>p</i> -Nitrosodimethylaniline hydrochloride..	186.56	177			
2753	C ₈ H ₁₁ ClN ₄ O ₂	Caffeine hydrochloride.....	230.58				1333
2753.1	C ₈ H ₁₁ ClO ₄	Ethyl chloromaleate.....	206.54		125.5 ¹⁹	1.191 ²⁵	
2754	C ₈ H ₁₁ Cl ₂ O ₆	α -Chloralose.....	309.46	230			
2755	C ₈ H ₁₁ I ₂ N ₄ O ₂	Caffeine triiodide.....	575.91	171			
2756	C ₈ H ₁₁ N	Dimethylaniline C ₈ H ₉ N(CH ₃) ₂	121.09	1.67	193.50	0.956	771
2757	C ₈ H ₁₁ N	2, 3-Dimethylaniline.....	121.09	> -15	223.8	0.992	756
2758	C ₈ H ₁₁ N	2, 4-Dimethylaniline.....	121.09		216	0.974	744
2759	C ₈ H ₁₁ N	2, 5-Dimethylaniline.....	121.09	15.5	217	0.980 ¹⁵	968
2760	C ₈ H ₁₁ N	2, 6-Dimethylaniline.....	121.09		216.9	0.979	748
2761	C ₈ H ₁₁ N	3, 4-Dimethylaniline.....	121.09	49	226	1.076	
2762	C ₈ H ₁₁ N	3, 5-Dimethylaniline.....	121.09		221	0.972	742
2763	C ₈ H ₁₁ N	<i>N</i> -Ethylaniline C ₈ H ₉ NH.C ₂ H ₅	121.09	-63.5	204.72	0.963	739
2764	C ₈ H ₁₁ N	<i>o</i> -Ethylaniline <i>o</i> -C ₂ H ₅ .C ₆ H ₄ .NH ₂	121.09		216	0.983 ²²	
2765	C ₈ H ₁₁ N	<i>m</i> -Ethylaniline <i>m</i> -C ₂ H ₅ .C ₆ H ₄ .NH ₂	121.09		215	0.990 ⁹	
2766	C ₈ H ₁₁ N	<i>p</i> -Ethylaniline <i>p</i> -C ₂ H ₅ .C ₆ H ₄ .NH ₂	121.09	-5	216.5	0.975 ²²	
2767	C ₈ H ₁₁ N	Methyl- <i>o</i> -toluidine CH ₃ .C ₆ H ₄ .NCH ₃	121.09		207	0.977	750
2768	C ₈ H ₁₁ N	Methyl- <i>m</i> -toluidine.....	121.09		206		
2769	C ₈ H ₁₁ N	Methyl- <i>p</i> -toluidine <i>p</i> -CH ₃ .C ₆ H ₄ .NHCH ₃	121.09		206		
2770	C ₈ H ₁₁ N	α -Phenylethylamine C ₈ H ₉ CH(NH ₂).CH ₃	121.09		187.4	0.940 ¹⁵	
2771	C ₈ H ₁₁ N	ω -Phenylethylamine C ₈ H ₉ CH ₂ CH ₂ .NH ₂	121.09		198.2	0.958 ^{24,4}	761
2772	C ₈ H ₁₁ N	2-Isopropylpyridine.....	121.09		159	0.934 ⁹	
2773	C ₈ H ₁₁ N	4-Isopropylpyridine.....	121.09		178	0.944 ⁹	
2774	C ₈ H ₁₁ N	2-Methyl-5-ethylpyridine.....	121.09		174	0.918 ²³	
2775	C ₈ H ₁₁ N	Nicotine.....	121.09		208	0.955	643
2776	C ₈ H ₁₁ N	2-Propylpyridine (Conyryne).....	121.09		165		
2777	C ₈ H ₁₁ N	2, 3, 4-Trimethylpyridine.....	121.09		188	0.913	
2778	C ₈ H ₁₁ N	2, 4, 5-Trimethylpyridine.....	121.09		168	0.966	
2779	C ₈ H ₁₁ N	2, 4, 6-Trimethylpyridine.....	121.09		172	0.917 ¹⁵	
2780	C ₈ H ₁₁ NO	Hydroxyethylaniline.....	137.09		286	1.110 ⁹	
2781	C ₈ H ₁₁ NO	<i>o</i> -Dimethylaminophenol.....	137.09	45	200		
2782	C ₈ H ₁₁ NO	<i>o</i> -Ethylaminophenol <i>o</i> -HOC ₆ H ₄ .NHC ₂ H ₅	139.09	107.5			
2783	C ₈ H ₁₁ NO	<i>m</i> -Ethylaminophenol.....	137.09	62	176 ¹²		
2784	C ₈ H ₁₁ NO	3-Amino-2-methoxytoluene.....	137.09		223		
2785	C ₈ H ₁₁ NO	5-Amino-2-methoxytoluene.....	137.09	53			
2786	C ₈ H ₁₁ NO	<i>o</i> -Phenetidine <i>o</i> -NH ₂ .C ₆ H ₄ .OC ₂ H ₅	137.09	> -21	229.2		
2787	C ₈ H ₁₁ NO	<i>m</i> -Phenetidine <i>m</i> -NH ₂ .C ₆ H ₄ .OC ₂ H ₅	137.09		248		
2788	C ₈ H ₁₁ NO	<i>p</i> -Phenetidine <i>p</i> -NH ₂ .C ₆ H ₄ .OC ₂ H ₅	137.09	2.4	254.2	1.061	
2789	C ₈ H ₁₁ NO	Dimethylaniline oxide C ₈ H ₉ N(CH ₃) ₂ .O.....	137.09	153			
2790	C ₈ H ₁₁ NO	Tyramine <i>p</i> -HOC ₆ H ₄ .CH ₂ CH ₂ .NH ₂	137.09	161			
2791	C ₈ H ₁₁ NO ₂ S	<i>m</i> -Dimethylanilinesulfonic acid.....	201.16	266 d.			
2792	C ₈ H ₁₁ NO ₂ S	<i>p</i> -Dimethylanilinesulfonic acid.....	201.16	257			
2793	C ₈ H ₁₁ NO ₂ S	<i>o</i> -Ethylaniline sulfonic acid.....	201.16	294 d.			
2794	C ₈ H ₁₁ N ₃ O	Maretin <i>m</i> -CH ₃ .C ₆ H ₄ .NH.NHCONH ₂	165.11	184			
2795	C ₈ H ₁₂	Dihydro- <i>o</i> -xylene.....	108.09		135		
2796	C ₈ H ₁₂	$\Delta^{1,2}$ -5-Dihydro- <i>m</i> -xylene.....	108.09		130	0.823	497
2797	C ₈ H ₁₂	$\Delta^{1,2}$ -3-Dihydro- <i>p</i> -xylene.....	108.09		135.6	0.830	529
2798	C ₈ H ₁₂ ClN	ω -Phenylethylamine hydrochloride.....	157.56	217			
2799	C ₈ H ₁₂ N ₂	Dimethylketine.....	136.11	86	189		
2800	C ₈ H ₁₂ N ₂	1, 1-Dimethyl- <i>m</i> -phenylenediamine.....	136.11		258	0.995 ²⁶	
2801	C ₈ H ₁₂ N ₂	1, 1-Dimethyl- <i>p</i> -phenylenediamine.....	136.11	41	262.3	1.036	
2802	C ₈ H ₁₂ N ₂	2, 6-Dimethylphenylhydrazine.....	136.11	46			
2803	C ₈ H ₁₂ N ₂	1-Ethyl-1-phenylhydrazine.....	136.11		237	1.018 ¹⁵	
2804	C ₈ H ₁₂ N ₂	1-Ethyl-2-phenylhydrazine.....	136.11		240		
2805	C ₈ H ₁₂ N ₂ O ₂	Phenylhydrazine acetate.....	168.11	69			
2806	C ₈ H ₁₂ N ₂ O ₃	<i>n</i> -Butylbarbituric acid.....	184.11	215			
2807	C ₈ H ₁₂ N ₂ O ₃	1, 3-Diethylbarbituric acid.....	184.11	52	167 ¹⁹		
2808	C ₈ H ₁₂ N ₂ O ₃	5, 5-Diethylbarbituric acid.....	184.11	191			
2808.1	C ₈ H ₁₂ N ₂ O ₄	Tetraacetylhydrazine [(CH ₃ CO) ₂ N] ₂	200.11	86			1203
2809	C ₈ H ₁₂ O	Amylpropionic aldehyde.....	124.09		187	0.89 ⁹	
2810	C ₈ H ₁₂ O ₂	Ethyl sorbate CH ₃ (CH:CH) ₂ CO ₂ C ₂ H ₅	140.09		76.5 ¹²	0.936	608

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2811	C ₈ H ₁₂ O ₄	Terpenylic acid	172.09	89			
2812	C ₈ H ₁₂ O ₄	Diethyl fumarate (CHCO ₂ C ₂ H ₅) ₂	172.09	0.6	218.5	1.052	377
2813	C ₈ H ₁₂ O ₄	Diethyl maleate (CHCO ₂ C ₂ H ₅) ₂	172.09		225	1.067	375
2814	C ₈ H ₁₂ O ₄	Ethyl diacetoacetate	172.09		211 s. d.	1.09	492
2815	C ₈ H ₁₂ O ₄	Dimeric diacetyl	172.09	58		1.560 ^{29,8}	
2816	C ₈ H ₁₂ O ₅	Ethyl oxalacetate	188.09		132 ²⁴	1.172	905
2816.1	C ₈ H ₁₂ BrO ₄	Diethyl bromoisosuccinate	253.02		122 ¹³	1.3183 ²⁵	
2817	C ₈ H ₁₃ N	Granatic acid	123.11	270			
2818	C ₈ H ₁₃ N	Tropidine	123.11		163	0.946	946
2819	C ₈ H ₁₃ NO	Tropinone	139.11	41	218.5	0.987 ^{99,6}	1141
2820	C ₈ H ₁₃ NO ₂	Arecolidine	155.11	110			
2821	C ₈ H ₁₃ NO ₂	Arecoline	155.11		220		
2822	C ₈ H ₁₃ NO ₂	Scopoline	155.11	110	243	1.016 ¹⁰⁶	
2823	C ₈ H ₁₃ N ₂ O ₂	Iminodiethylbarbituric acid	183.12	295			
2824	C ₈ H ₁₄	<i>n</i> -Hexylacetylene C ₈ H ₁₄ C≡CH	110.11		125	0.770 ⁹	818
2825	C ₈ H ₁₄	<i>d</i> -Lauroleone	110.11		120.5	0.797	397
2826	C ₈ H ₁₄	Methyl- <i>n</i> -amylacetylene	110.11		134		
2827	C ₈ H ₁₄	1, 2, 3, 4-Tetrahydro- <i>m</i> -xylene	110.11		124	0.801	398
2828	C ₈ H ₁₄ BrNO ₂	Arecoline hydrobromide	236.03	168			
2829	C ₈ H ₁₄ ClNO ₂	Arecolidine hydrochloride	191.57	98	250 d.		
2830	C ₈ H ₁₄ O	1, 1-Dimethylcyclohexene-3-ol	126.11		75 ¹⁶	0.933	926
2831	C ₈ H ₁₄ O	2, 2-Dimethylcyclohexanone	126.11		172.5	0.913	426
2832	C ₈ H ₁₄ O	2, 6-Dimethylcyclohexanone	126.11		55.3 ¹⁰	0.914	813
2833	C ₈ H ₁₄ O	Crotonyl ether (CH ₃ CH:CHCH ₂) ₂ O	126.11		145	0.890 ⁹	
2834	C ₈ H ₁₄ O	2-Methyl-2-heptene-6-one	126.11	-67.3	174	0.860	
2835	C ₈ H ₁₄ O	Homomesityl oxide	126.11		160 ²²⁵	0.863	406
2836	C ₈ H ₁₄ O ₂	Allyl isovalerate C ₈ H ₁₄ CO ₂ C ₄ H ₉	142.11		155		
2837	C ₈ H ₁₄ O ₂	Cyclohexyl acetate CH ₃ CO ₂ C ₆ H ₁₁	142.11		177		
2838	C ₈ H ₁₄ O ₂	Methyl hexahydrobenzoate	142.11		183	0.995 ¹	
2839	C ₈ H ₁₄ O ₃	Dialdan	158.11	130			
2840	C ₈ H ₁₄ O ₃	<i>n</i> -Butyric anhydride (C ₄ H ₇ CO) ₂ O	158.11	-75.0	198.2	0.969	
2841	C ₈ H ₁₄ O ₃	Isobutyric anhydride [(CH ₃) ₂ CHCO] ₂ O	158.11	-53.5	182.5	0.950	
2842	C ₈ H ₁₄ O ₃	1-Ethyl-3-acetylbutyric acid	158.11		158 ⁹		
2843	C ₈ H ₁₄ O ₄	<i>n</i> -Amylmalonic acid C ₈ H ₁₄ CH(CO ₂ H) ₂	174.11	82	140 d.		
2844	C ₈ H ₁₄ O ₄	2, 2'-Dimethyladipic acid	174.11	76	321		
2845	C ₈ H ₁₄ O ₄	Suberic acid HO ₂ C(CH ₂) ₆ CO ₂ H	174.11	140	279 ¹⁰⁰		
2846	C ₈ H ₁₄ O ₄	Diethyl methylmalonate	174.11		201.4	1.018	203
2847	C ₈ H ₁₄ O ₄	Diethyl succinate (CH ₃ CO ₂ C ₂ H ₅) ₂	174.11	-20.8	216.5	1.042	246
2848	C ₈ H ₁₄ O ₄	Di- <i>n</i> -propyl oxalate (CO ₂ C ₃ H ₇) ₂	174.11		211	1.018 ²²	
2849	C ₈ H ₁₄ O ₄	Ethyl isopropyl malonate	174.11		217 d.	0.987 ²¹	
2849.1	C ₈ H ₁₄ O ₅	Diethyl malate	190.11		253	1.128	355
2850	C ₈ H ₁₄ O ₅	Diethyl <i>d</i> -tartrate [CH(OH)CO ₂ C ₂ H ₅] ₂	206.11	17	280	1.202	421
2851	C ₈ H ₁₅ ClO	Capryl chloride C ₇ H ₁₅ COCl	162.57		196	0.975 ⁸	
2852	C ₈ H ₁₅ N	<i>n</i> -Caprylonitrile C ₇ H ₁₅ CN	125.12		200	0.820 ^{12,3}	
2853	C ₈ H ₁₅ N	α -Coniceine	125.12	-16	158	0.893 ¹⁴	
2854	C ₈ H ₁₅ N	β -Coniceine	125.12	41	169		
2855	C ₈ H ₁₅ N	γ -Coniceine	125.12	> -50	172	0.872	945
2856	C ₈ H ₁₅ N	δ -Coniceine	125.12		161.5	0.901 ¹⁵	
2857	C ₈ H ₁₅ N	Granatinine	125.12	60			
2858	C ₈ H ₁₅ N	Pseudoconiceine	125.12		172	0.878	
2859	C ₈ H ₁₅ N	Tropane	125.12		167	0.930	975
2860	C ₈ H ₁₅ NO	Granatoline	141.12	134			
2861	C ₈ H ₁₅ NO	Hygrine	141.12		195	0.935	
2862	C ₈ H ₁₅ NO	Pelletierine	141.12		195 d.	0.988 ⁹	
2863	C ₈ H ₁₅ NO	Pseudotropine	141.12	108	243		
2864	C ₈ H ₁₅ NO	Tropine	141.12	63	233	1.016 ¹⁰⁰	1146
2865	C ₈ H ₁₆	Cyclooctane (CH ₂) ₈	112.12	14.4	150.6	0.839	
2866	C ₈ H ₁₆	Diisobutylene (CH ₃) ₂ C:CHC(CH ₃) ₂	112.12		102.6	0.715 ¹⁴	
2867	C ₈ H ₁₆	<i>o</i> -Dimethylcyclohexane	112.12	-57.5	129.4	0.779	317
2868	C ₈ H ₁₆	<i>m</i> -Dimethylcyclohexane	112.12	-85	123.7	0.771	288
2869	C ₈ H ₁₆	<i>p</i> -Dimethylcyclohexane	112.12	-86	120.5	0.769	257
2870	C ₈ H ₁₆	Ethylcyclohexane C ₂ H ₅ C ₆ H ₁₁	112.12		128		
2871	C ₈ H ₁₆	2-Methyl-3-ethyl-2-pentene	112.12		117.1		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2872	C ₈ H ₁₆	2-Methyl-2-heptene (CH ₃) ₂ C:CHC ₄ H ₉ ..	112.12		125.2	0.816	
2873	C ₈ H ₁₆	4-Methyl-3-heptene	112.12		120.4	0.724	219
2874	C ₈ H ₁₆	<i>n</i> -Octylene CH ₃ (CH ₂) ₆ CH:CH ₂	112.12		123	0.722 ¹⁷	
2875	C ₈ H ₁₆ BrNO	Pelletierine hydrobromide.....	222.05	140			
2876	C ₈ H ₁₆ ClNO	Pelletierine hydrochloride.....	177.59	145			
2877	C ₈ H ₁₆ N ₂ O ₄	Ethylidene diurethane.....	204.14	126			
2878	C ₈ H ₁₆ O	1, 2-Dimethylcyclohexanol.....	128.12		166	0.926 ¹⁴	834
2879	C ₈ H ₁₆ O	<i>d</i> -1, 3-Dimethylcyclohexanol.....	128.12	72	69 ¹⁴		
2880	C ₈ H ₁₆ O	<i>dl</i> -1, 3-Dimethylcyclohexanol.....	128.12		169	0.911 ¹⁴	832
2881	C ₈ H ₁₆ O	1, 4-Dimethylcyclohexanol.....	128.12	50	170		
2882	C ₈ H ₁₆ O	2, 2-Dimethylcyclohexanol.....	128.12	8	72.2 ¹⁴	0.923	496
2883	C ₈ H ₁₆ O	2, 4-Dimethylcyclohexanol.....	128.12		179	0.912	888
2884	C ₈ H ₁₆ O	2, 5-Dimethylcyclohexanol.....	128.12		178.5	0.907	887
2885	C ₈ H ₁₆ O	2, 6-Dimethylcyclohexanol.....	128.12		174.7		
2886	C ₈ H ₁₆ O	3, 3-Dimethylcyclohexanol.....	128.12	11	99.5 ¹⁴	0.913 ¹⁴	468
2887	C ₈ H ₁₆ O	3, 4-Dimethylcyclohexanol.....	128.12		189.2	0.907	889
2888	C ₈ H ₁₆ O	<i>cis</i> -3, 5-Dimethylcyclohexanol.....	128.12		185	0.911	447
2889	C ₈ H ₁₆ O	<i>trans</i> -3, 5-Dimethylcyclohexanol.....	128.12		187.5	0.902 ¹⁶	463
2890	C ₈ H ₁₆ O	2-Methyl-2-heptene-6-ol.....	128.12		176	0.854	434
2891	C ₈ H ₁₆ O	Isoamyl allyl ether.....	128.12		120		
2892	C ₈ H ₁₆ O	<i>n</i> -Caprylic aldehyde C ₇ H ₁₄ CHO.....	128.12		81 ¹²	0.821	261
2893	C ₈ H ₁₆ O	Ethyl <i>n</i> -amyl ketone C ₇ H ₁₄ COC ₂ H ₅	128.12		168	0.850 ⁹	
2894	C ₈ H ₁₆ O	Ethyl isoamyl ketone.....	128.12		163.5		
2895	C ₈ H ₁₆ O	Methylbutyrene.....	128.12		180	0.827 ¹⁶	
2896	C ₈ H ₁₆ O	Methyl hexyl ketone CH ₃ COC ₆ H ₁₃	128.12	-21.6	172.7	0.818	225
2897	C ₈ H ₁₆ O	Methyl isohexyl ketone.....	128.12		204	0.817	
2898	C ₈ H ₁₆ O	Propyl isobutyl ketone.....	128.12		155	0.813	
2899	C ₈ H ₁₆ O ₂	<i>n</i> -Caprylic acid CH ₃ (CH ₂) ₆ CO ₂ H.....	144.12	16	237.5	0.910	296
2900	C ₈ H ₁₆ O ₂	Triethylacetic acid (C ₂ H ₅) ₃ CCO ₂ H.....	144.12	39.5	202		
2901	C ₈ H ₁₆ O ₂	Isoamyl propionate.....	144.12		160.2	0.870	163
2901.1	C ₈ H ₁₆ O ₂	<i>d</i> -β-Amyl propionate.....	144.12		58 ¹⁶	0.866	133
2902	C ₈ H ₁₆ O ₂	<i>tert</i> -Amyl propionate.....	144.12		143.5	0.855 ¹⁵	
2903	C ₈ H ₁₆ O ₂	Butyl <i>n</i> -butyrate C ₄ H ₇ CO ₂ C ₄ H ₉	144.12		166.4	0.872 ²⁰	148
2904	C ₈ H ₁₆ O ₂	Isobutyl <i>n</i> -butyrate.....	144.12		156.9	0.866 ¹⁶	140
2905	C ₈ H ₁₆ O ₂	Isobutyl isobutyrate.....	144.12	-80.7	148.7	0.875 ⁴	120
2906	C ₈ H ₁₆ O ₂	<i>tert</i> -Butylethyl acetate.....	144.12		157		
2907	C ₈ H ₁₆ O ₂	Ethyl <i>n</i> -caproate C ₆ H ₁₁ CO ₂ C ₂ H ₅	144.12		166.6	0.875 ¹⁴	
2908	C ₈ H ₁₆ O ₂	Heptyl formate HCO ₂ (CH ₂) ₆ CH ₃	144.12		176.7	0.894 ⁹	
2909	C ₈ H ₁₆ O ₂	<i>n</i> -Hexyl acetate CH ₃ CO ₂ (CH ₂) ₅ CH ₃	144.12		169.2	0.890 ⁹	
2909.1	C ₈ H ₁₆ O ₂	<i>d</i> -β-Hexyl acetate.....	144.12		57 ²⁰	0.864	139
2910	C ₈ H ₁₆ O ₂	Methyl <i>n</i> -heptylate C ₇ H ₁₃ CO ₂ CH ₃	144.12		172.1	0.881 ¹⁵	187
2911	C ₈ H ₁₆ O ₂	<i>n</i> -Propyl <i>n</i> -valerate C ₄ H ₉ CO ₂ C ₄ H ₉	144.12		167.5	0.889 ⁹	
2912	C ₈ H ₁₆ O ₂	<i>n</i> -Propyl isovalerate.....	144.12		155.9	0.863	141
2913	C ₈ H ₁₆ O ₂	1-Hydroxy- <i>n</i> -caprylic acid.....	160.12	69.5			
2914	C ₈ H ₁₆ O ₂	Amyl <i>l</i> -lactate CH ₃ CH(OH)CO ₂ C ₄ H ₉	160.12		110.5 ^{21, 18}	0.964 ⁴	
2915	C ₈ H ₁₆ O ₄	Metalddehyde (C ₂ H ₅ O) ₄	176.12		150		1172
2916	C ₈ H ₁₆ O ₄	Paraldol (C ₄ H ₈ O ₂) ₂	176.12	82			
2916.1	C ₈ H ₁₆ O ₄	Bismethoxyacetal.....	176.12	127			1238
2917	C ₈ H ₁₆ O ₆	Dambonite (Inosite dimethyl ether).....	208.12	195	210		
2918	C ₈ H ₁₆ O ₆	2, 3-Dimethyl-α-glucose.....	208.12	87			
2919	C ₈ H ₁₆ O ₆	2, 3-Dimethyl-β-glucose.....	208.12	110			
2920	C ₈ H ₁₆ O ₆	<i>d</i> , α-Ethylglucoside.....	208.12	114			1197
2921	C ₈ H ₁₆ O ₇	Ethyl <i>d</i> -gluconate.....	224.12	65			
2922	C ₈ H ₁₇ Br	<i>n</i> -Octyl bromide CH ₃ (CH ₂) ₆ CH ₂ Br.....	193.05		204	1.116 ¹⁶	
2922.1	C ₈ H ₁₇ Br	<i>l</i> -2-Bromooctane.....	193.05		71 ¹⁴	1.091 ¹⁷	
2923	C ₈ H ₁₇ BrN ₄	Hexamethylenetetramine bromoethylate (Bromalin).....	249.08	200			
2924	C ₈ H ₁₇ Cl	<i>n</i> -Octyl chloride CH ₃ (CH ₂) ₆ CHCl.....	148.59		184.6	0.879 ¹⁵	
2925	C ₈ H ₁₇ Cl	2-Chlorooctane C ₈ H ₁₇ CHClCH ₃	148.59		173	0.871 ¹⁵	
2926	C ₈ H ₁₇ F	<i>n</i> -Octyl fluoride CH ₃ (CH ₂) ₆ CH ₂ F.....	132.13		142.5	0.812 ^{14, 1}	94
2927	C ₈ H ₁₇ I	<i>n</i> -Octyl iodide CH ₃ (CH ₂) ₆ CH ₂ I.....	240.06	-45.9	225.5	1.341 ^{14, 18}	549
2928	C ₈ H ₁₇ N	<i>d</i> -Coniine.....	127.14	-2.5	166.5	0.845	978
2929	C ₈ H ₁₇ N	2, 4, 6-Trimethylpiperidine.....	127.14		147	0.831	954

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
2930	C ₈ H ₁₇ NO	Conhydrine (Hydroxyconiine).....	143.14	118	226		1333
2931	C ₈ H ₁₇ NO	α-Pseudoconhydrine.....	143.14	106	236.5		
2932	C ₈ H ₁₇ NO ₂	1-Hydroxy- <i>n</i> -caprylic amide.....	159.14	150			
2933	C ₈ H ₁₈	2, 5-Dimethylhexane.....	114.14	-91.0	109.2	0.693	87
2934	C ₈ H ₁₈	2, 3-Dimethylhexane.....	114.14		114.0	0.725 ¹⁵	178
2935	C ₈ H ₁₈	2, 4-Dimethylhexane.....	114.14		109.9	0.708 ¹⁵	138
2936	C ₈ H ₁₈	3, 4-Dimethylhexane.....	114.14		116.5	0.721	156
2937	C ₈ H ₁₈	Isooctane (CH ₃) ₂ CH(CH ₂) ₄ CH ₃	114.14		116.0	0.704 ¹⁵	103
2938	C ₈ H ₁₈	2-Methyl-3-ethylpentane.....	114.14		114	0.708 ¹⁵	134
2939	C ₈ H ₁₈	3-Methylheptane C ₂ H ₅ CH(CH ₂) ₄ C ₂ H ₅	114.14		122.2	0.707	
2940	C ₈ H ₁₈	4-Methylheptane (C ₂ H ₅) ₂ CHCH ₂	114.14		118.0	0.722	114
2941	C ₈ H ₁₈	<i>n</i> -Octane CH ₃ (CH ₂) ₆ CH ₃	114.14	-56.5	124.6	0.707 ¹⁵	112
2942	C ₈ H ₁₈	2-Ethylhexane CH ₃ (C ₂ H ₅)CHCH ₂ C ₂ H ₅	114.14		118.8	0.717 ¹⁵	135
2942.1	C ₈ H ₁₈	3-Ethylhexane (C ₂ H ₅) ₂ CHCH ₂ C ₂ H ₅	114.14		115	0.715	
2943	C ₈ H ₁₈	2, 2, 3, 3-Tetramethylbutane.....	114.14	104	106.8		
2944	C ₈ H ₁₈	2, 2, 3-Trimethylpentane.....	114.14		110.8	0.722 ¹⁵	233
2945	C ₈ H ₁₈ BrN	<i>d</i> -Coniine hydrobromide.....	208.06	211			
2946	C ₈ H ₁₈ ClN	<i>d</i> -Coniine hydrochloride.....	163.61	217			
2947	C ₈ H ₁₈ ClNO	Pseudoconhydrine hydrochloride.....	179.61	213			
2948	C ₈ H ₁₈ IN	Coniine hydroiodide.....	255.08	146			
2949	C ₈ H ₁₈ N ₂ O	Nitrosodiisobutylamine.....	158.16	-5	221	0.893 ²⁴	
2950	C ₈ H ₁₈ N ₂ O ₂	Coniine nitrate.....	190.16	83			
2951	C ₈ H ₁₈ O	Dibutyl alcohol.....	130.14		181.2	0.848 ^o	
2952	C ₈ H ₁₈ O	Diethylpropyl carbinol.....	130.14		160.5	0.838	339
2953	C ₈ H ₁₈ O	Dimethyl- <i>n</i> -amyl carbinol.....	130.14		162	0.879	322
2954	C ₈ H ₁₈ O	Dimethylisoamyl carbinol.....	130.14		154	0.823	254
2955	C ₈ H ₁₈ O	Ethylisoamyl carbinol.....	130.14	-61	166	0.808	247
2956	C ₈ H ₁₈ O	1-Hydroxy-2, 5-dimethylhexane.....	130.14		179.5	0.828	
2957	C ₈ H ₁₈ O	2-Hydroxy-2, 4-dimethylhexane.....	130.14		151		
2958	C ₈ H ₁₈ O	4-Hydroxy-3-ethylhexane.....	130.14		164	0.835 ^o	
2959	C ₈ H ₁₈ O	2-Hydroxy-4-methylheptane.....	130.14		168		
2960	C ₈ H ₁₈ O	<i>d</i> -6-Hydroxy-3-methylheptane.....	130.14		169	0.817	
2961	C ₈ H ₁₈ O	4-Hydroxy-2, 2, 4-trimethylpentane.....	130.14	-20	147.5	0.842 ^o	
2962	C ₈ H ₁₈ O	Methyl dipropyl carbinol.....	130.14		161.5	0.823	297
2963	C ₈ H ₁₈ O	Methylethylbutylcarbinol.....	130.14		160.6	0.827	298
2964	C ₈ H ₁₈ O	Methylethylisobutyl carbinol.....	130.14		152.4	0.830 ¹⁵	308
2965	C ₈ H ₁₈ O	Methylisohexyl carbinol.....	130.14		172	0.813	274
2966	C ₈ H ₁₈ O	<i>n</i> -Octyl alcohol CH ₃ (CH ₂) ₇ OH.....	130.14	-16.3	194	0.827	318
2967	C ₈ H ₁₈ O	<i>d</i> - <i>sec</i> .-Octyl alcohol C ₈ H ₁₇ CH(OH)CH ₃	130.14		86 ³⁰	0.822	279
2968	C ₈ H ₁₈ O	<i>dl</i> - <i>sec</i> .-Octyl alcohol C ₈ H ₁₇ CH(OH)CH ₃	130.14	-38.6	178.5	0.819	357
2969	C ₈ H ₁₈ O	Propylbutyl carbinol.....	130.14		71 ¹⁰	0.838 ^o	
2970	C ₈ H ₁₈ O	Propylisobutyl carbinol.....	130.14		164	0.821	248
2971	C ₈ H ₁₈ O	Isopropylbutyl carbinol.....	130.14		154	0.825	249
2972	C ₈ H ₁₈ O	Isopropylisobutyl carbinol.....	130.14		163	0.820 ¹⁵	
2973	C ₈ H ₁₈ O	<i>n</i> -Butyl ether C ₄ H ₉ OC ₄ H ₉	130.14		140.9	0.769 ²⁰	
2974	C ₈ H ₁₈ O	Isobutyl ether [(CH ₃) ₂ CHCH ₂] ₂ O.....	130.14		122.5	0.762	
2975	C ₈ H ₁₈ O	<i>sec</i> .-Butyl ether (C ₂ H ₅ CHCH ₂) ₂ O.....	130.14		121	0.756 ²¹	
2976	C ₈ H ₁₈ O	Ethyl hexyl ether C ₂ H ₅ OC ₆ H ₁₃	130.14		137		
2977	C ₈ H ₁₈ O	Methyl <i>n</i> -heptyl ether CH ₃ OC ₇ H ₁₅	130.14		149.8	0.795 ^o	
2978	C ₈ H ₁₈ O ₂ S	<i>n</i> -Butylsulfone (C ₄ H ₉) ₂ SO ₂	178.20	43.5			
2979	C ₈ H ₁₈ O ₂	Ethyl orthoacetate CH ₃ CH(OC ₂ H ₅) ₂	162.14		142	0.94 ²²	
2980	C ₈ H ₁₈ O ₄ S ₂	Trional C ₂ H ₅ (CH ₂) ₂ C(SO ₂ C ₂ H ₅) ₂	242.27	76			
2981	C ₈ H ₁₈ S	Di- <i>n</i> -butyl sulfide (C ₄ H ₉) ₂ S.....	146.20	-79.7	182	0.852 ^o	
2982	C ₈ H ₁₈ S	Diisobutyl sulfide [(CH ₃) ₂ CHCH ₂] ₂ S.....	146.20		171	0.836 ¹⁰	
2983	C ₈ H ₁₈ S	Di- <i>sec</i> .-butyl sulfide [C ₂ H ₅ CHCH ₂] ₂ S.....	146.20		165	0.832 ²³	
2984	C ₈ H ₁₉ N	Di- <i>n</i> -butylamine (C ₄ H ₉) ₂ NH.....	129.15		161		
2985	C ₈ H ₁₉ N	Diisobutylamine [(CH ₃) ₂ CHCH ₂] ₂ NH.....	129.15	-70.0	138.8	0.745	180
2986	C ₈ H ₁₉ N	<i>n</i> -Octylamine C ₈ H ₁₇ NH ₂	129.15		180	0.777 ²⁷	319
2987	C ₈ H ₁₉ N	<i>sec</i> .-Octylamine C ₈ H ₁₇ CH(CH ₃)NH ₂	129.15		164	0.771	292
2988	C ₈ H ₂₀ As ₂	Ethylcacodyl (C ₂ H ₅) ₂ As ₂ (C ₂ H ₅) ₂	266.07		190		
2989	C ₈ H ₁₁ NO	Tetraethylammonium hydroxide.....	147.17	190 d.			
2990	C ₈ H ₆ O ₄	Phthalonic anhydride.....	176.03	186			
2991	C ₈ H ₆ Cl ₂ N	2, 3-Dichloroquinoline.....	197.96	105			
2992	C ₈ H ₆ Cl ₂ N	2, 4-Dichloroquinoline.....	197.96	67			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2993	C ₉ H ₅ Cl ₂ N	5, 6-Dichloroquinoline.....	197.96	85			
2994	C ₉ H ₅ Cl ₂ N	5, 7-Dichloroquinoline.....	197.96	117			
2995	C ₉ H ₅ Cl ₂ N	5, 8-Dichloroquinoline.....	197.96	93			
2996	C ₉ H ₅ Cl ₂ N	6, 8-Dichloroquinoline.....	197.96	104			
2997	C ₉ H ₅ Cl ₂ N	7, 8-Dichloroquinoline.....	197.96	85.5			
2998	C ₉ H ₅ Br ₂ O ₂	<i>cis</i> -1, 2-Dibromocinnamic acid.....	216.96	100	124 ^{0.5}		
2999	C ₉ H ₅ Br ₂ O ₂	<i>trans</i> -2, 2-Dibromocinnamic acid.....	216.96	136	138 ^{0.6}		
3000	C ₉ H ₅ ClN	2-Chloroquinoline.....	163.51	38	275		
3001	C ₉ H ₅ ClN	3-Chloroquinoline.....	163.51		255.5		
3002	C ₉ H ₅ ClN	4-Chloroquinoline.....	163.51	34	260.4	1.251	
3003	C ₉ H ₅ ClN	5-Chloroquinoline.....	163.51	32	268		
3004	C ₉ H ₅ ClN	6-Chloroquinoline.....	163.51	41	262		
3005	C ₉ H ₅ ClN	7-Chloroquinoline.....	163.51	45	256		
3006	C ₉ H ₅ ClN	8-Chloroquinoline.....	163.51	> -20	288		
3007	C ₉ H ₅ Cl ₂ O ₂	<i>cis</i> -1, 2-Dichlorocinnamic acid.....	216.96	121			
3008	C ₉ H ₅ Cl ₂ O ₂	<i>trans</i> -1, 2-Dichlorocinnamic acid.....	216.96	101			
3009	C ₉ H ₅ INO ₃ S	Loretin.....	351.05	d.			
3010	C ₉ H ₅ N ₂ O ₂	5-Nitroquinoline.....	174.06	72			
3011	C ₉ H ₅ N ₂ O ₂	6-Nitroquinoline.....	174.06	150			
3012	C ₉ H ₅ N ₂ O ₂	7-Nitroquinoline.....	174.06	133			
3013	C ₉ H ₅ N ₂ O ₂	8-Nitroquinoline.....	174.06	89			
3014	C ₉ H ₅ O ₂	Phenylpropionic acid C ₉ H ₅ C:CCO ₂ H....	146.04	137			
3015	C ₉ H ₅ O ₂	Chromone.....	146.04	58			
3016	C ₉ H ₅ O ₂	Coumarine.....	146.04	67	301.7	0.935	
3017	C ₉ H ₅ O ₂	Umbelliferon.....	162.04	227			
3018	C ₉ H ₅ O ₄	Daphnetin.....	178.05	256			
3019	C ₉ H ₅ O ₄	Esculetin.....	178.05	270 d.			
3020	C ₉ H ₅ O ₄	Hemimellitic acid 1, 2, 3-C ₆ H ₃ (CO ₂ H) ₃ ..	210.04	190			
3021	C ₉ H ₅ O ₄	Trimellitic acid 1, 2, 4-C ₆ H ₃ (CO ₂ H) ₃ ..	210.05	216			
3022	C ₉ H ₅ O ₄	Trimesic acid 1, 3, 5-C ₆ H ₃ (CO ₂ H) ₃	210.05	350			
3023	C ₉ H ₅ O ₇	1, 3, 5-Tricarboxyphenol.....	226.05	180 d.			
3024	C ₉ H ₇ BrO ₂	<i>cis</i> -Allo-1-bromocinnamic acid.....	226.97	120	111 ^{0.6}		
3025	C ₉ H ₇ BrO ₂	<i>cis</i> -Allo-2-bromocinnamic acid.....	226.97	160	111 ^{0.6}		
3026	C ₉ H ₇ BrO ₂	<i>trans</i> -1-Bromocinnamic acid.....	226.97	131	121 ^{0.6}		
3027	C ₉ H ₇ BrO ₂	<i>trans</i> -2-Bromocinnamic acid.....	226.97	135	122 ^{0.6}		
3028	C ₉ H ₇ ClO	Cinnamyl chloride C ₉ H ₇ CH:CHCOCl..	166.51	36	257.5		
3029	C ₉ H ₇ ClO ₂	<i>cis</i> -Allo-1-chlorocinnamic acid.....	182.51	111	99 ^{0.6}		
3030	C ₉ H ₇ ClO ₂	<i>cis</i> -Allo-2-chlorocinnamic acid.....	182.51	132	97 ^{0.6}		
3031	C ₉ H ₇ ClO ₂	<i>trans</i> -1-Chlorocinnamic acid.....	182.51	137	109 ^{0.5}		
3032	C ₉ H ₇ ClO ₂	<i>trans</i> -2-Chlorocinnamic acid.....	182.51	142	113 ^{0.5}		
3033	C ₉ H ₇ ClO ₂	<i>o</i> -Chlorocinnamic acid.....	182.51	211			
3034	C ₉ H ₇ Cl ₃ O ₂	Benzyl trichloroacetate.....	253.43		178.5 ¹⁰	1.389 ⁴	692
3035	C ₉ H ₇ N	Cinnamic nitrile C ₉ H ₇ CH:CHCN.....	129.06	11	255	1.037 ⁰	
3036	C ₉ H ₇ N	Isoquinoline.....	129.06	23	243	1.099	1026
3037	C ₉ H ₇ N	Quinoline.....	129.06	-19.5	237.7	1.093	941
3038	C ₉ H ₇ NO	<i>p</i> -Cyanoacetophenone CN.C ₆ H ₄ COCH ₃ ..	145.06	61			
3039	C ₉ H ₇ NO	2-Hydroxyquinoline.....	145.06	200			
3040	C ₉ H ₇ NO	4-Hydroxyquinoline.....	145.06	201	300		
3041	C ₉ H ₇ NO	5-Hydroxyquinoline.....	145.06	224			
3042	C ₉ H ₇ NO	6-Hydroxyquinoline.....	145.06	193	360		
3043	C ₉ H ₇ NO	7-Hydroxyquinoline.....	145.06	238 d.			
3044	C ₉ H ₇ NO	8-Hydroxyquinoline.....	145.06	76	266.9		
3045	C ₉ H ₇ NO ₂	3-Aminocoumarine.....	161.06	130			
3046	C ₉ H ₇ NO ₂	Indole-2-carboxylic acid.....	161.06	203 d.			
3047	C ₉ H ₇ NO ₂	Indole-3-carboxylic acid.....	161.06	218 d.			
3048	C ₉ H ₇ NO ₂	Indoxylic acid.....	177.06		123		
3049	C ₉ H ₇ NO ₂	Kynuric acid.....	177.06	189			
3050	C ₉ H ₇ NO ₄	<i>o</i> -Nitrocinnamic acid.....	193.06	240			
3051	C ₉ H ₇ NO ₄	<i>m</i> -Nitrocinnamic acid.....	193.06	197			
3052	C ₉ H ₇ NO ₄	<i>p</i> -Nitrocinnamic acid.....	193.06	286			
3053	C ₉ H ₇ NO ₄ S	Diaphthol.....	225.13	295			
3054	C ₉ H ₉	Indene.....	116.06	-2	182.4	1.006	806
3055	C ₉ H ₉	Phenylallylene C ₉ H ₉ C:CCH ₃	116.06		185		
3056	C ₉ H ₉ Cl ₂	Cinnamal chloride C ₉ H ₉ CH:CH ₂ CHCl..	186.98	58.5	143 ¹⁰		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3057	C ₉ H ₈ Cl ₂ O ₂	Benzyl dichloroacetate	218.98		179 ⁹⁰	1.313 ₄	684
3058	C ₉ H ₈ I ₂ O ₂	Ethyl 3, 5-diiodosalicylate	417.93	132			
3059	C ₉ H ₈ N ₂	2-Aminoquinoline	144.08	129			
3060	C ₉ H ₈ N ₂	3-Aminoquinoline	144.08	94			1319
3061	C ₉ H ₈ N ₂	4-Aminoquinoline	144.08	154			
3062	C ₉ H ₈ N ₂	5-Aminoquinoline	144.08	110			
3063	C ₉ H ₈ N ₂	6-Aminoquinoline	144.08	114			
3064	C ₉ H ₈ N ₂	7-Aminoquinoline	144.08	189			
3065	C ₉ H ₈ N ₂	8-Aminoquinoline	144.08	70			
3066	C ₉ H ₈ N ₂	3-Phenylpyrazolone	144.08	240			
3067	C ₉ H ₈ N ₂ O	Cyanoacetanilide CNCH ₂ CONHC ₆ H ₅	160.08	200			
3068	C ₉ H ₈ N ₂ O	Pyrrone (Dipyrrolyl ketone)	160.08	160			
3069	C ₉ H ₈ O	Cinnamic aldehyde C ₆ H ₅ CH:CHCHO	132.06	-7.5	251.0	1.049	791
3070	C ₉ H ₈ O	α-Hydrindone	132.06	41	244	1.101 ⁴⁶	
3071	C ₉ H ₈ O	β-Hydrindone	132.06	61	225 d.	1.071 ⁶⁷	1100
3072	C ₉ H ₈ O ₂	o-Coumaric aldehyde	148.06	133			
3073	C ₉ H ₈ O ₂	p-Coumaric aldehyde	148.06	134			
3074	C ₉ H ₈ O ₂	Allocinnamic acid	148.06	68	125 ¹⁰		
3075	C ₉ H ₈ O ₂	Cinnamic acid C ₆ H ₅ CH:CHCO ₂ H	148.06	133	300	1.284 ⁴	
3076	C ₉ H ₈ O ₂	Isocinnamic acid	148.06	57	256 d.		
3077	C ₉ H ₈ O ₂	Atropic acid	148.06	107	267 d.		
3078	C ₉ H ₈ O ₂	Melilotic anhydride	148.06	25	272		
3079	C ₉ H ₈ O ₂	Chromanone	148.06	38.5	160 ⁹⁰		
3080	C ₉ H ₈ O ₂	Acetopiperone	164.06	83			
3081	C ₉ H ₈ O ₂	o-Acetylsalicylic aldehyde	164.06	37	253		
3082	C ₉ H ₈ O ₂	Benzoylacetic acid C ₆ H ₅ COCH ₂ CO ₂ H	164.06	104			
3083	C ₉ H ₈ O ₂	o-Coumaric acid	164.06	208			
3084	C ₉ H ₈ O ₂	m-Coumaric acid	164.06	191			
3085	C ₉ H ₈ O ₂	p-Coumaric acid	164.06	206			
3086	C ₉ H ₈ O ₂	Phenylpyruvic acid C ₆ H ₅ CH ₂ COCO ₂ H	164.06	157			
3087	C ₉ H ₈ O ₄	o-Acetylsalicylic acid (Aspirin)	180.06	133.5			1290
3088	C ₉ H ₈ O ₄	Caffeic acid	180.06	195			
3089	C ₉ H ₈ O ₄	Phenylmalonic acid C ₆ H ₅ CH(CO ₂ H) ₂	180.06	153			
3090	C ₉ H ₈ O ₄	Uvic acid 3, 5(CO ₂ H) ₂ C ₆ H ₃ CH ₃	180.06	290			
3091	C ₉ H ₈ O ₄	Methyl phthalate o-CO ₂ HC ₆ H ₄ CO ₂ CH ₃	180.06	82.5			
3092	C ₉ H ₈ O ₄	Benzoyl acetyl peroxide	180.06	36.6	130 ¹⁰		
3093	C ₉ H ₈ O ₅	Esculetinic acid	196.06	168			
3094	C ₉ H ₈ O ₅	Myristicin acid	196.06	210	300		
3095	C ₉ H ₇ BrO	Indene oxybromide	212.99	130.5			
3096	C ₉ H ₇ ClO ₂	Benzyl chloroacetate	184.53		147.5 ⁹	1.222 ₄	675
3097	C ₉ H ₇ N	Dihydroquinoline	131.08	226			
3098	C ₉ H ₇ N	1-Methylindole	131.08		242.4	1.071 ⁰	
3099	C ₉ H ₇ N	2-Methylindole	131.08	60	272.3		
3100	C ₉ H ₇ N	3-Methylindole (Scatole)	131.08	95	266.2		
3101	C ₉ H ₇ N	5-Methylindole	131.08	58.5			
3102	C ₉ H ₇ NO	Cinnamamide C ₆ H ₅ CH:CHCONH ₂	147.08	141.5			
3103	C ₉ H ₇ NO	Hydrocarbostyryl	147.08	163			1309
3104	C ₉ H ₇ NO ₂	o-Aminocinnamic acid	163.08	159 d.			
3105	C ₉ H ₇ NO ₂	m-Aminocinnamic acid	163.08	181			
3106	C ₉ H ₇ NO ₂	p-Aminocinnamic acid	163.08	176 d.			
3107	C ₉ H ₇ NO ₂	Benzoylacetalddehydeoxime	163.08	87			
3108	C ₉ H ₇ NO ₂	o-Acetylaminobenzoic acid	179.08	185			
3109	C ₉ H ₇ NO ₂	m-Acetylaminobenzoic acid	179.08	250			
3110	C ₉ H ₇ NO ₂	p-Acetylaminobenzoic acid	179.08	252			
3111	C ₉ H ₇ NO ₂	Hippuric acid C ₆ H ₅ CONHCH ₂ CO ₂ H	179.08	187.5	d.	1.371	1256
3112	C ₉ H ₇ NO ₂	Methyl oxanilate C ₆ H ₄ NHCOCO ₂ CH ₃	179.08	114			
3113	C ₉ H ₇ NO ₂	Acetylsalicylamide	179.08	144			
3114	C ₉ H ₇ NO ₄	Salicyluric acid	195.08	160			
3115	C ₉ H ₇ NO ₄	Ethyl m-nitrobenzoate	195.08	47	298		
3116	C ₉ H ₇ NO ₄	Ethyl p-nitrobenzoate	195.08	57			
3117	C ₉ H ₇ N ₂	5, 8-Diaminoquinoline	159.09	156			
3118	C ₉ H ₇ N ₂	6, 8-Diaminoquinoline	159.09	163			
3119	C ₉ H ₁₀	Benzylethylene C ₆ H ₅ CH ₂ CH:CH ₂	118.08		155	0.909	654

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3120	C ₉ H ₁₀	Isoallylbenzene C ₉ H ₉ CH:CHCH ₃	118.08		175	0.924 ¹⁶	
3121	C ₉ H ₁₀	Hydrindene.....	118.08		176.5	0.965	970
3122	C ₉ H ₁₀ N ₂	1-Ethylindazole.....	146.09		120 ¹⁵	1.064	878
3123	C ₉ H ₁₀ O ₂	2-Acetamino-4-nitrotoluene.....	194.09	96			
3124	C ₉ H ₁₀ O	Anol <i>p</i> -(CH ₂ :CH:CH)C ₆ H ₄ OH.....	134.08	93	250 d.		
3125	C ₉ H ₁₀ O	Chavicol <i>p</i> -(CH ₂ :CHCH ₃)C ₆ H ₄ OH.....	134.08	> -25	237	1.033 ¹⁸	935
3126	C ₉ H ₁₀ O	Cinnamyl alcohol C ₉ H ₉ CH:CHCH ₂ OH..	134.08	33	258.5	1.044	1039
3127	C ₉ H ₁₀ O	Allyl phenyl ether C ₉ H ₉ OC ₆ H ₅	134.08		192		
3128	C ₉ H ₁₀ O	Methyl styryl ether.....	134.08		213	1.001	877
3129	C ₉ H ₁₀ O	2, 4-Dimethylbenzaldehyde.....	134.08	-8	216		
3130	C ₉ H ₁₀ O	Hydrocinnamaldehyde.....	134.08	47	280		
3131	C ₉ H ₁₀ O	<i>o</i> -Xylene-4-aldehyde.....	134.08		225		
3132	C ₉ H ₁₀ O	Ethyl phenyl ketone C ₉ H ₉ COC ₆ H ₅	134.08	21	218	1.010	689
3133	C ₉ H ₁₀ O	Methyl benzyl ketone CH ₃ COCH ₂ C ₆ H ₅ ..	134.08	-15.4	216.7	1.028	
3134	C ₉ H ₁₀ O	<i>p</i> -Methylacetophenone (Melilot).....	134.08		222	1.013 ¹³	703
3135	C ₉ H ₁₀ O	Chromane.....	134.08		95 ¹²	1.064	
3135.1	C ₉ H ₁₀ OS	Ethyl thiobenzoate.....	166.14		253 ^{16a}	1.094 ²⁶	
3136	C ₉ H ₁₀ O ₂	<i>o</i> -Coumaral alcohol.....	150.08	119			
3137	C ₉ H ₁₀ O ₂	Hesperetol.....	150.08	57			
3138	C ₉ H ₁₀ O ₂	2, 3-Dimethylbenzoic acid.....	150.08	144			
3139	C ₉ H ₁₀ O ₂	2, 4-Dimethylbenzoic acid.....	150.08	126	268		
3140	C ₉ H ₁₀ O ₂	2, 5-Dimethylbenzoic acid.....	150.08	132	268	1.069	
3141	C ₉ H ₁₀ O ₂	2, 6-Dimethylbenzoic acid.....	150.08	116			
3142	C ₉ H ₁₀ O ₂	3, 4-Dimethylbenzoic acid.....	150.08	165			
3143	C ₉ H ₁₀ O ₂	<i>o</i> -Ethylbenzoic acid.....	150.08	68			
3144	C ₉ H ₁₀ O ₂	<i>m</i> -Ethylbenzoic acid.....	150.08	47		1.042 ¹⁰⁰	1148
3145	C ₉ H ₁₀ O ₂	<i>p</i> -Ethylbenzoic acid.....	150.08	113			
3146	C ₉ H ₁₀ O ₂	Hydratropic acid C ₉ H ₈ (C ₆ H ₅)CO ₂ H....	150.08		265		
3147	C ₉ H ₁₀ O ₂	Hydrocinnamic acid.....	150.08	48.6	279.8	1.071 ^{48.7}	
3148	C ₉ H ₁₀ O ₂	Mesitylinic acid 3, 5-(CH ₃) ₂ C ₆ H ₃ CO ₂ H..	150.08	166			
3149	C ₉ H ₁₀ O ₂	Benzyl acetate CH ₃ CO ₂ CH ₂ C ₆ H ₅	150.08	-51.5	213.5	1.058	673
3150	C ₉ H ₁₀ O ₂	<i>o</i> -Cresyl acetate <i>o</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃ ...	150.08		208		
3151	C ₉ H ₁₀ O ₂	<i>m</i> -Cresyl acetate <i>m</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃ ...	150.08		212		
3152	C ₉ H ₁₀ O ₂	<i>p</i> -Cresyl acetate <i>p</i> -CH ₃ CO ₂ C ₆ H ₄ CH ₃ ...	150.08		212.5	1.050	599
3154	C ₉ H ₁₀ O ₂	Ethyl benzoate C ₉ H ₈ CO ₂ C ₂ H ₅	150.08	-34.6	213.2	1.047	628
3155	C ₉ H ₁₀ O ₂	Methyl phenylacetate.....	150.08		220	1.044 ¹⁶	
3156	C ₉ H ₁₀ O ₂	Methyl <i>p</i> -toluate <i>p</i> -CH ₃ C ₆ H ₄ CO ₂ CH ₃ ..	150.08	33	217		
3157	C ₉ H ₁₀ O ₂	Phenyl propionate C ₉ H ₈ CO ₂ C ₆ H ₅	150.08	20	211	1.054 ¹⁵	
3158	C ₉ H ₁₀ O ₂	Acetovanillone.....	166.08	115	300		
3159	C ₉ H ₁₀ O ₂	Paeonol 4, 2-CH ₂ O(OH)C ₆ H ₄ COCH ₃ ...	166.08	50			
3160	C ₉ H ₁₀ O ₂	<i>o</i> -Ethoxybenzoic acid.....	166.08	22			
3161	C ₉ H ₁₀ O ₂	<i>m</i> -Ethoxybenzoic acid.....	166.08	137			
3162	C ₉ H ₁₀ O ₂	<i>p</i> -Ethoxybenzoic acid.....	166.08	195			
3163	C ₉ H ₁₀ O ₂	<i>dl</i> -Atrolactic acid.....	166.08	91			
3164	C ₉ H ₁₀ O ₂	<i>m</i> -Hydrocoumaric acid.....	166.08	111			
3165	C ₉ H ₁₀ O ₂	Melilotic acid.....	166.08	83			
3166	C ₉ H ₁₀ O ₂	<i>d</i> (<i>l</i>)-2-Phenyllactic acid.....	166.08	125			
3167	C ₉ H ₁₀ O ₂	Phloretic acid HOC ₆ H ₄ CH(CH ₃)CO ₂ H..	166.08	129			
3168	C ₉ H ₁₀ O ₂	<i>d</i> (<i>l</i>)-Tropic acid.....	166.08	128			
3169	C ₉ H ₁₀ O ₂	<i>dl</i> -Tropic acid.....	166.08	123			
3169.1	C ₉ H ₁₀ O ₂	Anisyl acetate <i>p</i> -CH ₃ OC ₆ H ₄ O ₂ CCH ₃ ...	166.08		139 ¹²	1.101	
3170	C ₉ H ₁₀ O ₂	Ethyl salicylate OHC ₆ H ₄ CO ₂ C ₂ H ₅	166.08	1.3	231.5	1.131	670
3171	C ₉ H ₁₀ O ₂	Guaiacyl acetate (Eucol).....	166.08		240	1.138	
3172	C ₉ H ₁₀ O ₂	Methyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ CH ₃ ...	166.08	48	256		
3173	C ₉ H ₁₀ O ₂	Methyl <i>o</i> -cresotinate.....	166.08	30	235		
3174	C ₉ H ₁₀ O ₂	Methyl <i>p</i> -cresotinate.....	166.08		242		
3175	C ₉ H ₁₀ O ₂	Methyl <i>dl</i> -mandelate.....	166.08	58	144 ²⁰		
3176	C ₉ H ₁₀ O ₄	Hydrocaffeic acid.....	182.08	139			
3177	C ₉ H ₁₀ O ₄	<i>d</i> (<i>l</i>)-Phenylglyceric acid.....	182.08	164			
3178	C ₉ H ₁₀ O ₄	<i>dl</i> -Phenylglyceric acid.....	182.08	141		1.451	
3179	C ₉ H ₁₀ O ₄	<i>d</i> (<i>l</i>)- <i>p</i> -Methoxymandelic acid.....	182.08	105		1.354	
3181	C ₉ H ₁₀ O ₄	Veratric acid 3, 4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H..	182.08	181			
3182	C ₉ H ₁₀ O ₄	Methoxymethyl salicylate.....	182.08		162 ⁴³	1.200 ¹⁵	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3183	C ₉ H ₁₀ O ₄	Methyl vanillate.....	182.08	63	287		
3184	C ₉ H ₁₀ O ₄	Glycol salicylate (Spirosal).....	182.08		170 ¹²		
3185	C ₉ H ₁₀ O ₆	Syringic acid.....	198.08	245			
3186	C ₉ H ₁₀ O ₆	Ethyl gallate.....	198.08	160			
3187	C ₉ H ₁₀ O ₆	2, 3, 4, 5-Dimethoxydihydroxybenzoic acid.....	214.08	148			
3187.1	C ₉ H ₁₀ S ₂	Ethyl dithiobenzoate.....	182.21		180 ²⁸	1.1439 ²⁸	
3188	C ₉ H ₁₁ N	Allyl aniline C ₉ H ₉ NHCH ₂ CH:CH ₂	133.09		209	0.982 ²⁸	
3189	C ₉ H ₁₁ N	Benzylideneethylamine.....	133.09		195.4		
3190	C ₉ H ₁₁ N	Styrylamine C ₉ H ₉ CH:CHCH ₂ NH ₂	133.09		237		
3191	C ₉ H ₁₁ N	1, 2, 3, 4-Tetrahydroisoquinoline.....	133.09		233	1.064	1012
3192	C ₉ H ₁₁ N	1, 2, 3, 4-Tetrahydroquinoline.....	133.09	20	251	1.055	1013
3193	C ₉ H ₁₁ NO	<i>p</i> -Dimethylaminobenzaldehyde.....	149.09	75			
3194	C ₉ H ₁₁ NO	<i>o</i> -Acetotoluide <i>o</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	110	296		1255
3195	C ₉ H ₁₁ NO	<i>m</i> -Acetotoluide <i>m</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	65.5	303		
3196	C ₉ H ₁₁ NO	<i>p</i> -Acetotoluide <i>p</i> -CH ₃ CONHC ₆ H ₄ CH ₃	149.09	153	307		1276
3197	C ₉ H ₁₁ NO	<i>N</i> -Benzylacetamide CH ₃ CONHC ₆ H ₇	149.09	61	300		
3198	C ₉ H ₁₁ NO	<i>N</i> -Ethylbenzamide C ₆ H ₅ CONHC ₂ H ₅	149.09	71	290		
3199	C ₉ H ₁₁ NO	<i>N</i> -Methylacetanilide (Exalgin).....	149.09	102	254.7		1250
3200	C ₉ H ₁₁ NO	Propionanilide C ₆ H ₅ CONHC ₃ H ₇	149.09	104			
3201	C ₉ H ₁₁ NOS	<i>N</i> -Phenylthiourethane.....	181.16	69			
3202	C ₉ H ₁₁ NO ₂	4-Acetylamino-2-hydroxytoluene.....	165.09	225			
3203	C ₉ H ₁₁ NO ₂	3-Acetylamino-4-hydroxytoluene.....	165.09	160			
3204	C ₉ H ₁₁ NO ₂	<i>p</i> -Acetylmethylaminophenol.....	165.09	240			
3205	C ₉ H ₁₁ NO ₂	1-Anilinopropionic acid.....	165.09	162			
3206	C ₉ H ₁₁ NO ₂	<i>o</i> -Dimethylanthranilic acid.....	165.09	175			
3207	C ₉ H ₁₁ NO ₂	<i>m</i> -Ethylaminobenzoic acid.....	165.09	101			
3208	C ₉ H ₁₁ NO ₂	<i>l</i> -Phenylalanine.....	165.09	283 d.			1269
3209	C ₉ H ₁₁ NO ₂	<i>dl</i> -Phenylalanine.....	165.09	265 d.			
3210	C ₉ H ₁₁ NO ₂	<i>o</i> -Tolylaminoacetic acid.....	165.09	150			
3211	C ₉ H ₁₁ NO ₂	<i>p</i> -Tolylaminoacetic acid.....	165.09	118			
3212	C ₉ H ₁₁ NO ₂	2, 4, 6-Trimethylpyridine-3-carboxylic acid.....	165.09		155		
3213	C ₉ H ₁₁ NO ₂	Ethyl <i>p</i> -aminobenzoate.....	165.09	91			
3214	C ₉ H ₁₁ NO ₂	Ethyl anthranilate.....	165.09		260		
3216	C ₉ H ₁₁ NO ₂	<i>o</i> -Acetanilide <i>o</i> -CH ₃ OC ₆ H ₄ NHCOCH ₃	165.09	84	305		
3217	C ₉ H ₁₁ NO ₂	<i>p</i> -Acetanilide CH ₃ CONHC ₆ H ₄ OCH ₃	165.09	127			
3218	C ₉ H ₁₁ NO ₂	<i>p</i> -Formylphenetidine.....	165.09	60			
3219	C ₉ H ₁₁ NO ₂	Nitrocumene (CH ₃) ₂ CHC ₆ H ₄ NO ₂	165.09	-35	224 d.		
3220	C ₉ H ₁₁ NO ₂	Nitromesitylene.....	165.09	44	255		
3221	C ₉ H ₁₁ NO ₂	<i>N</i> -Phenylurethane C ₆ H ₅ CO ₂ NHC ₆ H ₅	165.09	52	238		
3222	C ₉ H ₁₁ NO ₂	<i>l</i> -Tyrosine.....	181.09	295 d.		1.456	1259
3223	C ₉ H ₁₂	Cumene (CH ₃) ₂ CHC ₆ H ₅	120.09		153.4	0.864	561
3224	C ₉ H ₁₂	<i>o</i> -Ethyltoluene <i>o</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09	> -17	162	0.882	615
3225	C ₉ H ₁₂	<i>m</i> -Ethyltoluene <i>m</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09		162.5	0.867	585
3226	C ₉ H ₁₂	<i>p</i> -Ethyltoluene <i>p</i> -C ₂ H ₅ C ₆ H ₄ CH ₃	120.09	< -20	162	0.862	568
3227	C ₉ H ₁₂	Hemimellitene 1, 2, 3-(CH ₃) ₃ C ₆ H ₃	120.09		176.5	0.895	650
3228	C ₉ H ₁₂	Mesitylene 1, 3, 5-(CH ₃) ₃ C ₆ H ₃	120.09	-52.7	164.6	0.863	580
3229	C ₉ H ₁₂	<i>n</i> -Propylbenzene CH ₃ (CH ₂) ₂ C ₆ H ₅	120.09	-101.6	157.5	0.862	556
3230	C ₉ H ₁₂	Pseudocumene 1, 2, 4-(CH ₃) ₃ C ₆ H ₃	120.09	-61.0	169.8	0.87	622
3231	C ₉ H ₁₂ N ₂ O	1-Ethyl-2-phenylurea.....	164.11	99			
3232	C ₉ H ₁₂ N ₂ O ₂	<i>p</i> -Phenetylurea C ₆ H ₅ OC ₆ H ₄ NHCONH ₂	180.11	173			
3233	C ₉ H ₁₂ N ₂ O ₂	Pilosinine.....	180.11	79	300 ²⁸		
3234	C ₉ H ₁₂ N ₂ O ₂	1, 3, 7, 9-Tetramethyluric acid.....	224.12	228	d.		1268
3235	C ₉ H ₁₂ O	Benzylmethyl carbinol.....	136.09		212	0.994	
3235.1	C ₉ H ₁₂ O	<i>d</i> -Benzylmethyl carbinol.....	136.09		125 ²⁸	0.991	660
3236	C ₉ H ₁₂ O	Ethylphenyl carbinol.....	136.09		219	0.996	
3237	C ₉ H ₁₂ O	Hydrocinnamyl alcohol.....	136.09	< -18	237.4	1.008	706
3238	C ₉ H ₁₂ O	Mesitol 2, 4, 6-(CH ₃) ₃ C ₆ H ₃ OH.....	136.09	69	220		
3239	C ₉ H ₁₂ O	<i>o-n</i> -Propylphenol <i>o</i> -C ₃ H ₇ C ₆ H ₄ OH.....	136.09		226.6	1.015 ⁹	
3240	C ₉ H ₁₂ O	<i>m-n</i> -Propylphenol <i>m</i> -C ₃ H ₇ C ₆ H ₄ OH.....	136.09	26	228		
3241	C ₉ H ₁₂ O	<i>p-n</i> -Propylphenol <i>p</i> -C ₃ H ₇ C ₆ H ₄ OH.....	136.09	61	232.6	1.009 ⁹	
3242	C ₉ H ₁₂ O	Pseudocumenol 2, 4, 5-(CH ₃) ₃ C ₆ H ₃ OH.....	136.09	72	235		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3243	C ₉ H ₁₂ O	Ethyl benzyl ether C ₉ H ₁₀ OC ₂ H ₅	136.09		226	0.998 ^{17.5}	
3244	C ₉ H ₁₂ O	Ethyl <i>m</i> -cresyl ether.....	136.09		192	0.949	648
3245	C ₉ H ₁₂ O	Ethyl <i>p</i> -cresyl ether <i>p</i> -CH ₃ C ₆ H ₄ OC ₂ H ₅	136.09		189.9	0.874 ⁰	928
3246	C ₉ H ₁₂ O	Propyl phenyl ether C ₉ H ₁₀ OC ₃ H ₇	136.09		190.5	0.968	
3247	C ₉ H ₁₂ O	Isopropyl phenyl ether.....	136.09		177.2	0.946 ¹⁵	
3248	C ₉ H ₁₂ O ₂	Mesorcinol.....	152.09	150	275.5		
3249	C ₉ H ₁₂ O ₂	Guaiacyl ethyl ether.....	152.09		213		
3250	C ₉ H ₁₂ O ₂	Phloroglucinol trimethyl ether.....	168.09	52	255.5		
3251	C ₉ H ₁₂ O ₂	Pyrogallol trimethyl ether.....	168.09	47	241	1.099 ⁷⁵	
3252	C ₉ H ₁₂ O ₂	Metacrolein (C ₃ H ₄ O) ₃	168.09	46			
3253	C ₉ H ₁₂ O ₂	Caryophyllenic acid.....	168.09			1.140	
3254	C ₉ H ₁₂ O ₂ S	Mesitylenesulfonic acid.....	200.16	77			
3255	C ₉ H ₁₂ O ₂ S	Toluene <i>p</i> -ethylsulfonate.....	200.16	33	173 ¹⁵	1.174 ³²	
3256	C ₉ H ₁₂ O ₂	Anhydrocamphoric acid.....	200.09	133			
3257	C ₉ H ₁₂ N	Cumidine <i>p</i> -(CH ₃) ₂ CHC ₆ H ₄ NH ₂	135.11	63	225	0.957	1333
3258	C ₉ H ₁₂ N	Dimethyl- <i>o</i> -toluidine.....	135.11	-61.0	184.6	0.929	682
3259	C ₉ H ₁₂ N	Dimethyl- <i>m</i> -toluidine.....	135.11		212.5	0.941	733
3260	C ₉ H ₁₂ N	Dimethyl- <i>p</i> -toluidine.....	135.11		211.5	0.937	726
3261	C ₉ H ₁₂ N	Ethyl- <i>o</i> -toluidine.....	135.11		214	0.953 ^{15.5}	
3262	C ₉ H ₁₂ N	Ethyl- <i>m</i> -toluidine.....	135.11		222		
3263	C ₉ H ₁₂ N	Ethyl- <i>p</i> -toluidine.....	135.11		217	0.939	
3264	C ₉ H ₁₂ N	Mesidine 1, 3, 5-(CH ₃) ₃ C ₆ H ₃ NH ₂	135.11		233	0.963	
3265	C ₉ H ₁₂ N	α -Mesitylamine.....	135.11		218.2	0.950	699
3266	C ₉ H ₁₂ N	Parvoline.....	135.11		234		
3267	C ₉ H ₁₂ N	<i>n</i> -Propylaniline C ₆ H ₅ NHC ₃ H ₇	135.11		222	0.949 ¹⁵	
3268	C ₉ H ₁₂ N	Isopropylaniline C ₆ H ₅ NHCH(CH ₃) ₂	135.11		213		
3269	C ₉ H ₁₂ N	Pseudocumidine.....	135.11	66	235		
3270	C ₉ H ₁₂ NO ₂	Anhydroecgonine.....	167.11	235 d.			
3271	C ₉ H ₁₂ NO ₂	Adrenaline.....	183.11	207 d.			
3272	C ₉ H ₁₄	Apocyclene.....	122.11	43	138.9	0.871 ⁴⁰	1056
3273	C ₉ H ₁₄	Santene.....	122.11		142	0.869 ¹⁵	486
3274	C ₉ H ₁₄ ClNO ₂	Anhydroecgonine hydrochloride.....	203.57	241			
3275	C ₉ H ₁₄ N ₂ O ₂	Ethylpropylbarbituric acid.....	198.12	146			
3276	C ₉ H ₁₄ O	Nopinone.....	138.11	0	209		
3277	C ₉ H ₁₄ O	Phorone.....	138.11	28	198.5	0.885	598
3278	C ₉ H ₁₄ O ₂	Launolic acid.....	154.11		129 ^{11.5}		
3279	C ₉ H ₁₄ O ₂	Methyl amylpropiolate.....	154.11		111 ¹⁵	0.991 ¹⁵	
3280	C ₉ H ₁₄ O ₂	Castelamarin.....	170.11	269			
3281	C ₉ H ₁₄ O ₄	<i>cis</i> -Hexahydrohomophthalic acid.....	186.11	146			
3282	C ₉ H ₁₄ O ₄	<i>trans</i> -Hexahydrohomophthalic acid.....	186.11	157			
3282.1	C ₉ H ₁₄ O ₄	<i>dl</i> -Pinic acid.....	186.11	102.5	216 ¹⁰	1.093 ^{109.4}	1154
3282.2	C ₉ H ₁₄ O ₄	<i>d</i> -Pinic acid.....	186.11	136	216 ¹⁰		
3283	C ₉ H ₁₄ O ₄	Diethyl citraconate.....	186.11		230.3	1.062	847
3284	C ₉ H ₁₄ O ₄	Diethyl glutaconate.....	186.11		238	1.050	
3285	C ₉ H ₁₄ O ₄	Diethyl itaconate.....	186.11		227.9	1.045	369
3286	C ₉ H ₁₄ O ₄	Diethyl mesaconate.....	186.11		229	1.047	594
3287	C ₉ H ₁₄ O ₅	4-Ketoazelaic acid.....	202.11	102; 109			
3288	C ₉ H ₁₄ O ₅	<i>l</i> -Camphoric acid.....	218.11	165			
3289	C ₉ H ₁₄ O ₅	Glycerol triacetate.....	218.11		259	1.161	326
3290	C ₉ H ₁₄ O ₇	Trimethyl citrate.....	234.11	79	287 d.		
3291	C ₉ H ₁₄ NO	Pseudopelletierine.....	153.12	49	246	1.001 ^{99.5}	1138
3292	C ₉ H ₁₄ NO ₂	<i>d</i> -Ecgonine.....	185.12	257			
3293	C ₉ H ₁₄ NO ₂	<i>l</i> -Ecgonine.....	185.12	198 d.		1.370 ¹⁵	
3294	C ₉ H ₁₄ NO ₂	<i>dl</i> -Ecgonine.....	185.12	212			
3294.1	C ₉ H ₁₄ N ₂ O ₂ S	Ergothioneine.....	229.21	290			
3295	C ₉ H ₁₆	Campholene.....	124.12	> -20	133	0.803	399
3296	C ₉ H ₁₆	Nopinane.....	124.12		149.5	0.861 ²²	479
3297	C ₉ H ₁₆	Pulegone.....	124.12		139	0.791 ²²	979
3298	C ₉ H ₁₆ ClNO ₂	<i>l</i> -Ecgonine hydrochloride.....	221.59	246			
3299	C ₉ H ₁₆ N ₂ O ₂ S ₂	Cheiroline.....	328.33	48	200 d.		
3300	C ₉ H ₁₆ O	Camphorol.....	140.12		81 ¹⁶		
3301	C ₉ H ₁₆ O	α -Nopinol.....	140.12	102	205		
3302	C ₉ H ₁₆ O	<i>dl</i> -Santenol.....	140.12	98	196	0.987	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3303	C ₉ H ₁₆ O ₂	Amyl <i>l</i> -crotonate.....	156.12			0.896	360
3304	C ₉ H ₁₆ O ₂	Ethyl hexahydrobenzoate.....	156.12		196.5	0.967 ₄ ¹⁵	886
3305	C ₉ H ₁₆ O ₂	Methyl cyclohexylacetate.....	156.12		202	0.990 ₀ ¹⁴	
3306	C ₉ H ₁₆ O ₂	Ethyl isopropylacetoacetate.....	172.12		205 d.	0.960 ₅ ¹⁵	
3307	C ₉ H ₁₆ O ₄	Azelaic acid HO ₂ C(CH ₂) ₇ CO ₂ H.....	188.12	106.5	360	1.029	1155
3308	C ₉ H ₁₆ O ₄	<i>n</i> -Butyl ethyl malonate.....	188.12		130 ¹²	0.976 ₂ ¹⁵	284
3309	C ₉ H ₁₆ O ₄	Isobutyl ethyl malonate.....	188.12		120*	0.968 ₂ ¹⁵	286
3310	C ₉ H ₁₆ O ₄	<i>sec</i> .-Butyl ethyl malonate.....	188.12		160 ¹⁰	0.986 ₂ ¹⁵	310
3311	C ₉ H ₁₆ O ₄	Diethyl dimethylmalonate.....	188.12		196	0.995	196
3312	C ₉ H ₁₆ O ₄	Diethyl glutarate CH ₂ (CH ₂ COC ₂ H ₅) ₂ ...	188.12		237	1.025	
3313	C ₉ H ₁₆ O ₄	Dipropyl malonate CH ₂ (CO ₂ C ₃ H ₇) ₂ ...	188.12		228.3	1.027 ⁹	
3314	C ₉ H ₁₆ O ₄	Propyl isopropyl malonate.....	188.12		143 ¹²	0.980 ₂ ¹⁵	293
3314.1	C ₉ H ₁₇ BrO	<i>l</i> -Amyl bromobutyrate.....	221.05		105 ¹¹	1.196 ¹⁵	
3315	C ₉ H ₁₇ NO	Homotropine.....	155.14	85			
3316	C ₉ H ₁₇ NO	Methylpelletierine.....	155.14		215		
3317	C ₉ H ₁₇ NO	Triacetoneamine.....	155.14	39.6			
3318	C ₉ H ₁₈	Cyclononane.....	126.14		172	0.773 ₄ ¹⁶	
3319	C ₉ H ₁₈	Ethylcycloheptane C ₂ H ₅ C ₇ H ₁₅	126.14	< -30	199	0.952	
3320	C ₉ H ₁₈	Hexahydrocumene (CH ₃) ₃ CHC ₆ H ₁₁	126.14		150	0.787	
3321	C ₉ H ₁₈	2-Methyl-1-octene C ₈ H ₁₇ C(CH ₃):CH ₂ ...	126.14		143		
3322	C ₉ H ₁₈	Nonylene C ₈ H ₁₇ CH:CHCH ₃	126.14		149.9	0.754 ₁ ¹⁵	
3323	C ₉ H ₁₈	Propylcyclohexane C ₃ H ₇ C ₆ H ₁₁	126.14		149.5	0.767	
3324	C ₉ H ₁₈ O	<i>dl</i> -Pulenol.....	142.14		187.5	0.908	902
3325	C ₉ H ₁₈ O	Pelargonic aldehyde CH ₃ (CH ₂) ₇ CHO.....	142.14		93.5 ²²	0.828 ₁ ¹⁵	280
3326	C ₉ H ₁₈ O	Diisobutyl ketone [(CH ₃) ₂ CHCH ₂] ₂ CO.....	142.14		182	0.833	
3327	C ₉ H ₁₈ O	Isopropyl isoamyl ketone.....	142.14		172		
3328	C ₉ H ₁₈ O ₂	Pelargonic acid CH ₃ (CH ₂) ₇ CO ₂ H.....	158.14	12	254	0.907	340
3329	C ₉ H ₁₈ O ₂	Amyl <i>n</i> -butyrate C ₈ H ₁₇ CO ₂ C ₄ H ₉	158.14		184.8	0.883 ₀ ⁹	184
3330	C ₉ H ₁₈ O ₂	Isoamyl <i>n</i> -butyrate.....	158.14		178.6	0.882 ₀ ⁹	
3330.1	C ₉ H ₁₈ O ₂	<i>d</i> -β-Amyl <i>n</i> -butyrate.....	158.14		71 ¹⁶	0.869	161
3331	C ₉ H ₁₈ O ₂	Amyl isobutyrate (CH ₃) ₂ CHCO ₂ C ₄ H ₉	158.14		155	0.859	167
3332	C ₉ H ₁₈ O ₂	Butyl <i>n</i> -valerate C ₄ H ₉ CO ₂ C ₄ H ₉	158.14		185.8	0.885 ⁹	
3333	C ₉ H ₁₈ O ₂	Isobutyl <i>n</i> -valerate.....	158.14		167	0.854	
3333.1	C ₉ H ₁₈ O ₂	<i>d</i> - <i>sec</i> .-Butyl valerate.....	158.14		67 ¹⁸	0.860	164
3334	C ₉ H ₁₈ O ₂	Isobutyl isovalerate.....	158.14		168.5	0.854	162
3335	C ₉ H ₁₈ O ₂	Ethyl <i>n</i> -heptylate C ₆ H ₁₃ CO ₂ C ₂ H ₅	158.14		187.1	0.872 ₁ ¹⁵	195
3336	C ₉ H ₁₈ O ₂	<i>n</i> -Heptyl acetate CH ₃ CO ₂ C ₇ H ₁₅	158.14		191.5	0.874 ₁ ¹⁵	221
3337	C ₉ H ₁₈ O ₂	Methyl caprylate C ₇ H ₁₅ CO ₂ CH ₃	158.14	-41	192.9	0.887	
3338	C ₉ H ₁₈ O ₂	<i>d</i> -β-Octylformate.....	158.14		82 ²⁰	0.872 ₁ ¹⁵	209
3339	C ₉ H ₁₈ O ₂	Propyl caproate C ₆ H ₁₁ CO ₂ C ₃ H ₇	158.14		185.5	0.884 ₀ ⁹	
3340	C ₉ H ₁₈ O ₃	Parapropionaldehyde (C ₃ H ₇ O) ₃	174.14		170		
3341	C ₉ H ₁₈ O ₃	Di- <i>n</i> -butyl carbonate (C ₄ H ₉ O) ₂ CO.....	174.14		207.7	0.924	
3342	C ₉ H ₁₈ O ₃	Diisobutyl carbonate.....	174.14		190.3	0.919 ¹⁵	
3343	C ₉ H ₁₈ O ₄	1, 2-Dihydroxypelargonic acid.....	190.14	123			
3344	C ₉ H ₁₈ O ₇	Galactite.....	238.14		142		1214
3345	C ₉ H ₁₉ N	<i>l</i> -1-Methylconiine.....	141.15		175.5	0.832 ₄ ¹⁶	
3346	C ₉ H ₁₉ NO	<i>N</i> -Diethyl- <i>n</i> -valeramide.....	157.15		210		
3347	C ₉ H ₂₀	2, 4-Dimethylheptane.....	128.15		133.3	0.716	143
3348	C ₉ H ₂₀	<i>d</i> -2, 5-Dimethylheptane.....	128.15		137	0.715 ₁ ¹⁶	
3349	C ₉ H ₂₀	<i>dl</i> -2, 5-Dimethylheptane.....	128.15		135.9	0.719 ₁ ¹⁵	144
3350	C ₉ H ₂₀	2, 6-Dimethylheptane.....	128.15		132.0	0.712 ₁ ¹⁵	
3351	C ₉ H ₂₀	4-Ethylheptane (C ₂ H ₅) ₂ CHC ₂ H ₅	128.15		139	0.741	170
3352	C ₉ H ₂₀	<i>d</i> -3-Methyloctane.....	128.15		143.4	0.721 ₁ ¹⁷	
3353	C ₉ H ₂₀	4-Methyloctane C ₂ H ₅ (CH ₂) ₃ CHC ₂ H ₅	128.15		141.6	0.732 ₁ ¹⁵	147
3354	C ₉ H ₂₀	<i>n</i> -Nonane CH ₃ (CH ₂) ₇ CH ₃	128.15	-51	150.6	0.718	151
3355	C ₉ H ₂₀ O	Butyl- <i>sec</i> .-butyl carbinol.....	144.15		180	0.834	335
3356	C ₉ H ₂₀ O	Dibutyl carbinol (C ₄ H ₉) ₂ CHOH.....	144.15		194	0.823	320
3357	C ₉ H ₂₀ O	Diisobutyl carbinol.....	144.15		174.3	0.816 ₁ ¹³	271
3358	C ₉ H ₂₀ O	Di- <i>sec</i> .-butyl carbinol.....	144.15		171	0.836	338
3359	C ₉ H ₂₀ O	Diethylisobutyl carbinol.....	144.15		172		
3360	C ₉ H ₂₀ O	4, 6-Dimethylheptane-2-ol.....	144.15		195	0.879 ⁹	
3361	C ₉ H ₂₀ O	Methylethylisoamyl carbinol.....	144.15		175	0.829	329
3362	C ₉ H ₂₀ O	Methylethyl- <i>tert</i> .-amyl carbinol.....	144.15		166	0.832	348

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3363	C ₉ H ₂₀ O	Methylpropylisobutyl carbinol.	144.15		171.3	0.826	330
3364	C ₉ H ₂₀ O	<i>n</i> -Nonyl alcohol CH ₃ (CH ₂) ₈ OH.	144.15	-5	215	0.828	344
3365	C ₉ H ₂₀ O	Isobutyl- <i>d</i> -amyl ether.	144.15		148.2	0.773	125
3366	C ₉ H ₂₀ O	Ethyl <i>n</i> -heptyl ether C ₂ H ₅ OC ₇ H ₁₅	144.15		166.6	0.790 ¹⁶	
3367	C ₉ H ₂₀ O	Methyl <i>n</i> -octyl ether CH ₃ OC ₈ H ₁₇	144.15		173	0.802 ¹⁶	
3368	C ₉ H ₂₀ O ₂	Propylidene dipropyl ether.	136.15		166.2	0.849 ⁹	
3369	C ₉ H ₂₀ O ₄	Ethyl orthocarbonate C(OC ₂ H ₅) ₄	192.15		159	0.917	90
3370	C ₉ H ₂₀ O ₄ S ₂	Tetronal (C ₂ H ₅) ₂ C(SO ₂ C ₂ H ₅) ₂	256.28	85			
3371	C ₉ H ₂₁ N	<i>n</i> -Nonylamine C ₉ H ₁₉ NH ₂	143.17		195		
3372	C ₉ H ₂₁ N	Tri- <i>n</i> -propylamine (C ₃ H ₇) ₃ N.	143.17	-93.5	156	0.757	230
3373	C ₁₀ H ₄ Cl ₆	Hexachloronaphthalene.	334.76	143			
3374	C ₁₀ H ₄ Cl ₆	α-Tetrachloronaphthalene.	265.86	130			
3375	C ₁₀ H ₄ Cl ₆	β-Tetrachloronaphthalene.	265.86	194			
3376	C ₁₀ H ₄ Cl ₆	γ-Tetrachloronaphthalene.	265.86	176			
3377	C ₁₀ H ₄ Cl ₆	δ-Tetrachloronaphthalene.	265.86	141			
3378	C ₁₀ H ₄ Cl ₆	ε-Tetrachloronaphthalene.	265.86	180			
3379	C ₁₀ H ₄ Cl ₆	ζ-Tetrachloronaphthalene.	265.86	160.5			
3380	C ₁₀ H ₄ Cl ₆	<i>vic.</i> -Tetrachloronaphthalene.	265.86	140			
3381	C ₁₀ H ₄ N ₄ O ₈	α-Tetranitronaphthalene.	308.06	259	exp.		
3382	C ₁₀ H ₄ N ₄ O ₈	1, 2, 5, 8-Tetranitronaphthalene.	308.06	270 d.			
3383	C ₁₀ H ₄ N ₄ O ₈	1, 2, 6, 8-Tetranitronaphthalene.	308.06	<300			
3384	C ₁₀ H ₄ N ₄ O ₈	1, 3, 5, 8-Tetranitronaphthalene.	308.06	195			
3385	C ₁₀ H ₄ N ₄ O ₈	1, 3, 6, 8-Tetranitronaphthalene.	308.06	203	exp.		
3386	C ₁₀ H ₄ N ₄ O ₈	2, 4, 5, 7-Tetranitro-α-naphthol.	324.06	180			
3387	C ₁₀ H ₃ Cl ₃	1, 2, 3-Trichloronaphthalene.	231.41	81			
3388	C ₁₀ H ₃ Cl ₃	1, 2, 4-Trichloronaphthalene.	231.41	92			
3389	C ₁₀ H ₃ Cl ₃	1, 2, 5-Trichloronaphthalene.	231.41	78			
3390	C ₁₀ H ₃ Cl ₃	1, 2, 6-Trichloronaphthalene.	231.41	97			
3391	C ₁₀ H ₃ Cl ₃	1, 2, 7-Trichloronaphthalene.	231.41	88			
3392	C ₁₀ H ₃ Cl ₃	1, 2, 8-Trichloronaphthalene.	231.41	83.5			
3393	C ₁₀ H ₃ Cl ₃	1, 3, 5-Trichloronaphthalene.	231.41	103			
3394	C ₁₀ H ₃ Cl ₃	1, 3, 6-Trichloronaphthalene.	231.41	80.5			
3395	C ₁₀ H ₃ Cl ₃	1, 3, 7-Trichloronaphthalene.	231.41	113			
3396	C ₁₀ H ₃ Cl ₃	1, 3, 8-Trichloronaphthalene.	231.41	89.5			
3397	C ₁₀ H ₃ Cl ₃	1, 4, 5-Trichloronaphthalene.	231.41	131			
3398	C ₁₀ H ₃ Cl ₃	1, 4, 6-Trichloronaphthalene.	231.41	66			
3399	C ₁₀ H ₃ Cl ₃	1, 6, 7-Trichloronaphthalene.	231.41	109.5			
3400	C ₁₀ H ₃ Cl ₃	2, 3, 6-Trichloronaphthalene.	231.41	91			
3401	C ₁₀ H ₃ Cl ₃	2, 3, 7-Trichloronaphthalene.	231.41	90			
3402	C ₁₀ H ₄ NO ₁₀	Pyridinepentacarboxylic acid.	299.05	220 d.			
3403	C ₁₀ H ₃ N ₃ O ₆	1, 2, 5-Trinitronaphthalene.	263.06	113			
3404	C ₁₀ H ₃ N ₃ O ₆	1, 3, 5-Trinitronaphthalene.	263.06	123			
3405	C ₁₀ H ₃ N ₃ O ₆	1, 3, 8-Trinitronaphthalene.	263.06	218			
3406	C ₁₀ H ₃ N ₃ O ₆	1, 4, 5-Trinitronaphthalene.	263.06	247			
3407	C ₁₀ H ₃ N ₃ O ₇	2, 4, 5-Trinitro-α-naphthol.	279.06	189.5			
3408	C ₁₀ H ₃ N ₃ O ₇	2, 4, 7-Trinitro-α-naphthol.	279.06	145			
3409	C ₁₀ H ₃ N ₃ O ₇	2, 4, 8-Trinitro-α-naphthol.	279.06	175			
3410	C ₁₀ H ₃ ClNO ₂	4-Chloro-1-nitronaphthalene.	207.51	84			
3411	C ₁₀ H ₃ ClNO ₂	7-Chloro-1-nitronaphthalene.	207.51	116			
3412	C ₁₀ H ₆ Cl ₂	1, 2-Dichloronaphthalene.	196.96	37	282	1.315 ₄ ^{16, 17}	1076
3413	C ₁₀ H ₆ Cl ₂	1, 3-Dichloronaphthalene.	196.96	61	289		
3414	C ₁₀ H ₆ Cl ₂	1, 4-Dichloronaphthalene.	196.96	68	287.6	1.300 ₄ ¹⁶	1104
3415	C ₁₀ H ₆ Cl ₂	1, 5-Dichloronaphthalene.	196.96	107			
3416	C ₁₀ H ₆ Cl ₂	1, 6-Dichloronaphthalene.	196.96	48			
3417	C ₁₀ H ₆ Cl ₂	1, 7-Dichloronaphthalene.	196.96	62	286	1.261 ₁ ¹⁰⁰	1149
3418	C ₁₀ H ₆ Cl ₂	1, 8-Dichloronaphthalene.	196.96	88	d.	1.292 ₄ ¹⁰⁰	1150
3419	C ₁₀ H ₆ Cl ₂	2, 3-Dichloronaphthalene.	196.96	120			
3420	C ₁₀ H ₆ Cl ₂	2, 6-Dichloronaphthalene.	196.96	135	285		
3421	C ₁₀ H ₆ Cl ₂	2, 7-Dichloronaphthalene.	196.96	114			
3422	C ₁₀ H ₆ Cl ₂ O	2, 3-Dichloro-α-naphthol.	212.96	101			
3423	C ₁₀ H ₆ Cl ₂ O	2, 4-Dichloro-α-naphthol.	212.96	108			
3424	C ₁₀ H ₆ Cl ₂ O	5, 7-Dichloro-α-naphthol.	212.96	132			
3425	C ₁₀ H ₆ Cl ₂ O	5, 8-Dichloro-α-naphthol.	212.96	115			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3426	C ₁₀ H ₆ Cl ₂ O	6, 7-Dichloro- α -naphthol.....	212.96	151			
3427	C ₁₀ H ₆ Cl ₂ O	7, 8-Dichloro- α -naphthol.....	212.96	95			
3428	C ₁₀ H ₆ Cl ₂ O	1, 3-Dichloro- β -naphthol.....	212.96	81			
3429	C ₁₀ H ₆ Cl ₂ O	1, 4-Dichloro- β -naphthol.....	212.96	124			
3429.1	C ₁₀ H ₆ Cl ₂ O	3, 6-(6, 8)-Dichloro- β -naphthol.....	212.96	125			
3430	C ₁₀ H ₆ Cl ₂ O ₄ S ₂	Naphthalene-1, 5-disulfonechloride.....	325.09	183			
3431	C ₁₀ H ₆ Cl ₂ O ₄ S ₂	Naphthalene-1, 6-disulfonechloride.....	325.09	129			
3432	C ₁₀ H ₆ Cl ₂ O ₄ S ₂	Naphthalene-2, 6-disulfonechloride.....	325.09	226			
3433	C ₁₀ H ₆ Cl ₂ O ₄ S ₂	Naphthalene-2, 7-disulfonechloride.....	325.09	162			
3434	C ₁₀ H ₆ N ₂ O ₂	Pyrocoll.....	186.06	269			
3435	C ₁₀ H ₆ N ₂ O ₄	1, 2-Dinitronaphthalene.....	218.06	103			
3436	C ₁₀ H ₆ N ₂ O ₄	1, 3-Dinitronaphthalene.....	218.06	145			
3437	C ₁₀ H ₆ N ₂ O ₄	1, 4-Dinitronaphthalene.....	218.06	129			
3438	C ₁₀ H ₆ N ₂ O ₄	1, 5-Dinitronaphthalene.....	218.06	216			
3439	C ₁₀ H ₆ N ₂ O ₄	1, 6-Dinitronaphthalene.....	218.06	162			
3440	C ₁₀ H ₆ N ₂ O ₄	1, 7-Dinitronaphthalene.....	218.06	156			
3441	C ₁₀ H ₆ N ₂ O ₄	1, 8-Dinitronaphthalene.....	218.06	170			
3442	C ₁₀ H ₆ N ₂ O ₆	2, 4-Dinitro- α -naphthol.....	234.06	138			
3443	C ₁₀ H ₆ N ₂ O ₆	4, 5-Dinitro- α -naphthol.....	234.06	230 d.			
3444	C ₁₀ H ₆ N ₂ O ₆	4, 8-Dinitro- α -naphthol.....	234.06	235 d.			
3445	C ₁₀ H ₆ N ₂ O ₆	1, 6-Dinitro- β -naphthol.....	234.06	195			
3446	C ₁₀ H ₆ N ₂ O ₆	1, 8-Dinitro- β -naphthol.....	234.06	198			
3447	C ₁₀ H ₆ O ₂	1, 2-Naphthoquinone.....	158.05	120 d.			
3448	C ₁₀ H ₆ O ₂	1, 4-Naphthoquinone.....	158.05	125			
3449	C ₁₀ H ₆ O ₂	2, 6-Naphthoquinone.....	158.05	135			
3450	C ₁₀ H ₆ O ₃	Mellophanic acid.....	254.05	238			
3451	C ₁₀ H ₆ O ₃	Prehnitic acid.....	254.05	237 d.			
3452	C ₁₀ H ₆ O ₃	Pyromellitic acid.....	254.05	264			
3453	C ₁₀ H ₇ Br	α -Bromonaphthalene.....	206.97	5	281.1	1.476	799
3454	C ₁₀ H ₇ Br	β -Bromonaphthalene.....	206.97	59	282	1.605 ^o	
3455	C ₁₀ H ₇ Cl	α -Chloronaphthalene.....	162.51		258	1.191	795
3456	C ₁₀ H ₇ Cl	β -Chloronaphthalene.....	162.51	56	264.3	1.138 ^{70.7}	1102
3457	C ₁₀ H ₇ ClO	2-Chloro- α -naphthol.....	178.51	70			
3458	C ₁₀ H ₇ ClO	4-Chloro- α -naphthol.....	178.51	117			
3459	C ₁₀ H ₇ ClO	5-Chloro- α -naphthol.....	178.51	131.5			
3460	C ₁₀ H ₇ ClO	6-Chloro- α -naphthol.....	178.51	94			
3461	C ₁₀ H ₇ ClO	7-Chloro- α -naphthol.....	178.51	123			
3462	C ₁₀ H ₇ ClO	1-Chloro- β -naphthol.....	178.51	71			
3463	C ₁₀ H ₇ ClO	5-Chloro- β -naphthol.....	178.51	128			
3464	C ₁₀ H ₇ ClO	6-Chloro- β -naphthol.....	178.51	115			
3465	C ₁₀ H ₇ ClO	7-Chloro- β -naphthol.....	178.51	126.5			
3466	C ₁₀ H ₇ ClO	8-Chloro- β -naphthol.....	178.51	101	308		
3467	C ₁₀ H ₇ ClO ₂ S	Naphthalene-1-sulfonechloride.....	226.58	68	195 ¹³		
3468	C ₁₀ H ₇ ClO ₂ S	Naphthalene-2-sulfonechloride.....	226.58	76	201 ¹³		
3469	C ₁₀ H ₇ F	α -Fluoronaphthalene.....	146.05		216.5	1.135 ^o	
3470	C ₁₀ H ₇ F	β -Fluoronaphthalene.....	146.05	59	212.5		
3471	C ₁₀ H ₇ IO	1-Iodo- β -naphthol.....	269.99	94.5			
3472	C ₁₀ H ₇ NO	Cinnamyl cyanide C ₆ H ₅ CH:CH ₂ COCN.....	157.06	115			
3473	C ₁₀ H ₇ NO ₂	α -Nitronaphthalene.....	173.06	58.8	304	1.331 ⁴	
3474	C ₁₀ H ₇ NO ₂	β -Nitronaphthalene.....	173.06	79	165 ¹⁴		
3475	C ₁₀ H ₇ NO ₂	2-Nitroso- α -naphthol.....	173.06	152			
3476	C ₁₀ H ₇ NO ₂	4-Nitroso- α -naphthol.....	173.06	194			
3477	C ₁₀ H ₇ NO ₂	1-Nitroso- β -naphthol.....	173.06	109.5			
3478	C ₁₀ H ₇ NO ₂	Cinchoninic acid.....	173.06	254			
3479	C ₁₀ H ₇ NO ₂	Quinaldinic acid.....	173.06	156			
3480	C ₁₀ H ₇ NO ₂	Quinoline-3-carboxylic acid.....	173.06	275			
3481	C ₁₀ H ₇ NO ₂	Quinoline-6-carboxylic acid.....	173.06	292			
3482	C ₁₀ H ₇ NO ₂	Quinoline-7-carboxylic acid.....	173.06	249			
3483	C ₁₀ H ₇ NO ₂	Quinoline-8-carboxylic acid.....	173.06	187.5			
3484	C ₁₀ H ₇ NO ₃	α -Kynurenic acid.....	189.06	283			
3485	C ₁₀ H ₇ NO ₃	2-Nitro- α -naphthol.....	189.06	128			
3486	C ₁₀ H ₇ NO ₃	3-Nitro- α -naphthol.....	189.06	168			
3487	C ₁₀ H ₇ NO ₃	4-Nitro- α -naphthol.....	189.06	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3488	C ₁₀ H ₇ NO ₂	5-Nitro- α -naphthol.....	189.06	171			
3489	C ₁₀ H ₇ NO ₂	1-Nitro- β -naphthol.....	189.06	103			
3490	C ₁₀ H ₇ NO ₂	5-Nitro- β -naphthol.....	189.06	147			
3491	C ₁₀ H ₇ NO ₂	6-Nitro- β -naphthol.....	189.06	158			
3492	C ₁₀ H ₇ NO ₂	8-Nitro- β -naphthol.....	189.06	145			
3493	C ₁₀ H ₇ NO ₄	Indolecarboxylic acid.....	205.06	>250 d.			
3494	C ₁₀ H ₈	Naphthalene C ₁₀ H ₈	128.06	80.1	217.9	1.145	1143
3495	C ₁₀ H ₈ Cl ₄	Naphthalenetetrachloride.....	269.89	182			
3496	C ₁₀ H ₁₀ IN	Quinoline methiodide C ₉ H ₇ N.CH ₃ I.....	271.02	133			
3497	C ₁₀ H ₈ N ₂	2, 3'-Dipyridyl.....	156.08		289		
3498	C ₁₀ H ₈ N ₂	3, 3'-Dipyridyl.....	156.08	68	296.5	1.164	
3499	C ₁₀ H ₈ N ₂	4, 4'-Dipyridyl.....	156.08	112	304.8		
3500	C ₁₀ H ₈ N ₂	Nicotelline.....	156.08	148	<300		
3501	C ₁₀ H ₈ N ₂ O ₂	3-Nitro- α -naphthylamine.....	188.08	137			
3502	C ₁₀ H ₈ N ₂ O ₂	6-Nitro- α -naphthylamine.....	188.08	143			
3503	C ₁₀ H ₈ N ₂ O ₂	7-Nitro- α -naphthylamine.....	188.08	122			
3504	C ₁₀ H ₈ N ₂ O ₂	1-Nitro- β -naphthylamine.....	188.08	127			
3505	C ₁₀ H ₈ N ₂ O ₂	5-Nitro- β -naphthylamine.....	188.08	143			
3506	C ₁₀ H ₈ N ₂ O ₂	8-Nitro- β -naphthylamine.....	188.08	105			
3507	C ₁₀ H ₈ O	α -Naphthol C ₁₀ H ₇ OH.....	144.06	96	280	1.099 ^{99.3}	1126
3508	C ₁₀ H ₈ O	β -Naphthol C ₁₀ H ₇ OH.....	144.06	122	286	1.217 ⁴	1333
3509	C ₁₀ H ₈ O ₂	1, 2-Dihydroxynaphthalene.....	160.06	60			
3510	C ₁₀ H ₈ O ₂	1, 3-Dihydroxynaphthalene.....	160.06	125			
3511	C ₁₀ H ₈ O ₂	1, 4-Dihydroxynaphthalene.....	160.06	176			
3512	C ₁₀ H ₈ O ₂	1, 5-Dihydroxynaphthalene.....	160.06	258			
3513	C ₁₀ H ₈ O ₂	1, 6-Dihydroxynaphthalene.....	160.06	138			
3514	C ₁₀ H ₈ O ₂	1, 7-Dihydroxynaphthalene.....	160.06	178			
3515	C ₁₀ H ₈ O ₂	1, 8-Dihydroxynaphthalene.....	160.06	140			
3516	C ₁₀ H ₈ O ₂	2, 3-Dihydroxynaphthalene.....	160.06	159			
3517	C ₁₀ H ₈ O ₂	2, 6-Dihydroxynaphthalene.....	160.06	216			
3518	C ₁₀ H ₈ O ₂	2, 7-Dihydroxynaphthalene.....	160.06	190			
3519	C ₁₀ H ₈ O ₂ S	Naphthalene-1-sulfinic acid.....	192.13	85			
3520	C ₁₀ H ₈ O ₂ S	Naphthalene-2-sulfinic acid.....	192.13	105			
3521	C ₁₀ H ₈ O ₃	1, 4, 5-Trihydroxynaphthalene.....	176.06	170			
3522	C ₁₀ H ₈ O ₃	1, 3, 6-Trihydroxynaphthalene.....	176.06	97			
3523	C ₁₀ H ₈ O ₃	2-Benzoylacrylic acid.....	176.06	99			
3524	C ₁₀ H ₈ O ₃ S	Naphthalene-1-sulfonic acid.....	208.13	90			
3525	C ₁₀ H ₈ O ₃ S	Naphthalene-2-sulfonic acid.....	208.13	102			
3526	C ₁₀ H ₈ O ₄	Anemonin.....	192.06	189 s. d.	300 d.		
3527	C ₁₀ H ₈ O ₄	α -Carboxycinnamic acid.....	192.06	175			
3528	C ₁₀ H ₈ O ₄	Furoin.....	192.06	135			
3529	C ₁₀ H ₈ O ₄	β -Methylesculetin.....	192.06	204			
3530	C ₁₀ H ₈ O ₄	Scopoletin.....	192.06	204			
3531	C ₁₀ H ₈ O ₄	1, 4, 5, 6-Tetrahydroxynaphthalene.....	192.06	154			
3532	C ₁₀ H ₈ O ₄ S	α -Naphthol-2-sulfonic acid.....	224.13	<250			
3533	C ₁₀ H ₈ O ₄ S	α -Naphthol-4-sulfonic acid.....	224.13	170 d.			
3534	C ₁₀ H ₈ O ₄ S	α -Naphthol-5-sulfonic acid.....	224.13	120			
3535	C ₁₀ H ₈ O ₄ S	α -Naphthol-8-sulfonic acid.....	224.13	107			
3536	C ₁₀ H ₈ O ₄ S	β -Naphthol-6-sulfonic acid.....	224.13	125			
3537	C ₁₀ H ₈ O ₄ S	β -Naphthol-7-sulfonic acid.....	224.13	89			
3538	C ₁₀ H ₈ O ₅	Fraxetin.....	208.06	227			
3539	C ₁₀ H ₈ O ₅ S ₂	Naphthalene-1, 5-disulfonic acid.....	288.19	d.			1303
3540	C ₁₀ H ₈ O ₅ S ₂	Naphthalene-1, 6-disulfonic acid.....	288.19	125 d.			1271
3541	C ₁₀ H ₈ O ₇	Cotarnic acid.....	240.06	178			
3542	C ₁₀ H ₈ S	α -Thionaphthol C ₁₀ H ₇ SH.....	160.13		285 d.	1.146 ³³	
3543	C ₁₀ H ₈ S	β -Thionaphthol C ₁₀ H ₇ SH.....	160.13	81	288 s. d.	1.550	
3544	C ₁₀ H ₉ ClO ₂	Chloralacetophenone.....	267.44	77			
3545	C ₁₀ H ₉ N	3-Methylquinoline.....	143.08	14	250	1.074	
3546	C ₁₀ H ₉ N	4-Methylquinoline (Lepidine).....	143.08		262	1.086	
3547	C ₁₀ H ₉ N	6-Methylquinoline.....	143.08		255	1.066	1003
3548	C ₁₀ H ₉ N	7-Methylquinoline.....	143.08		252.5	1.072	788
3549	C ₁₀ H ₉ N	8-Methylquinoline.....	143.08		143 ³⁴	1.073	789
3550	C ₁₀ H ₉ N	α -Naphthylamine C ₁₀ H ₇ NH ₂	143.08	50	301	1.131	1080

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3551	C ₁₀ H ₉ N	β-Naphthylamine C ₁₀ H ₇ NH ₂	143.08	110.2	306.1	1.061 ₄ ⁸⁸	
3552	C ₁₀ H ₉ NO	3-Amino-β-naphthol.....	159.08	234			
3553	C ₁₀ H ₉ NO	7-Amino-β-naphthol.....	159.08	163			
3554	C ₁₀ H ₉ NO	2-Hydroxyquinaldine.....	159.08	205			
3555	C ₁₀ H ₉ NO	4-Hydroxyquinaldine.....	159.08	231			
3556	C ₁₀ H ₉ NO	6-Hydroxyquinaldine.....	159.08	213			
3557	C ₁₀ H ₉ NO	7-Hydroxyquinaldine.....	159.08	234			
3558	C ₁₀ H ₉ NO	8-Hydroxyquinaldine.....	159.08	74	267		
3559	C ₁₀ H ₉ NO	Echinopsine.....	159.08	152			
3560	C ₁₀ H ₉ NO ₂	α-Scatolecarboxylic acid.....	175.08	165			
3572	C ₁₀ H ₉ N ₂ O ₄	Anilalloxan.....	235.09	248 d.			
3573	C ₁₀ H ₁₀	1, 2-Dihydronaphthalene.....	130.08	-9	84.5 ¹⁶	0.997	
3574	C ₁₀ H ₁₀	1, 4-Dihydronaphthalene.....	130.08	15.5	212	0.998	844
3575	C ₁₀ H ₁₀	1-Ethyl-2-phenylacetylene.....	130.08		203	0.923	
3576	C ₁₀ H ₁₀	Phenylcrotonylene C ₆ H ₅ CH:CHC ₂ H ₅ ...	130.08		190		
3578	C ₁₀ H ₁₀ Cl ₂ NO ₂	Chloral- <i>p</i> -acetaminophenol.....	298.46	160 d.			
3579	C ₁₀ H ₁₀ NO ₄	Oxycannabin.....	208.09	182			
3580	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 2-diamine.....	158.09	96			
3581	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 4-diamine.....	158.09	120			
3582	C ₁₀ H ₁₀ N ₂	Naphthylene-1, 5-diamine.....	158.09	189.5			
3583	C ₁₀ H ₁₀ N ₂	1, 6-Naphthylenediamine.....	158.09	77.5		1.147 ₄ ^{89, 4}	1137
3584	C ₁₀ H ₁₀ N ₂	1, 8-Naphthylenediamine.....	158.09	66.5		1.127 ₄ ^{89, 4}	1135
3585	C ₁₀ H ₁₀ N ₂ O	<i>N</i> -Phenyl-3-methylpyrazolone.....	174.09	127	191 ¹⁷		1287
3586	C ₁₀ H ₁₀ N ₂ O ₂ S	<i>N</i> -Sulfo-phenyl-3-methylpyrazolone.....	254.16	320 d.			
3587	C ₁₀ H ₁₀ O	Benzylideneacetone.....	146.08	42	262	1.008	1068
3588	C ₁₀ H ₁₀ O	1, 2-Dihydro-β-naphthol.....	146.08	35	164 ²⁸		
3589	C ₁₀ H ₁₀ O ₂	<i>cis</i> -Isosafrol.....	162.08	> -18	243	1.117 ₄ ¹⁵	868
3590	C ₁₀ H ₁₀ O ₂	<i>trans</i> -Isosafrol.....	162.08		248	1.123 ₄ ¹⁵	869
3591	C ₁₀ H ₁₀ O ₂	Safrol CH ₂ :O ₂ :C ₆ H ₄ C ₂ H ₅	162.08	11	234.5	1.096	812
3592	C ₁₀ H ₁₀ O ₂	Benzoylpropionaldehyde.....	162.08		244.4	0.998 ¹⁵	
3593	C ₁₀ H ₁₀ O ₂	Benzoylacetone C ₆ H ₅ COCH ₂ COCH ₃ ...	162.08	61	262	1.090 ⁶⁰	1106
3594	C ₁₀ H ₁₀ O ₂	1-Benzylacrylic acid CH ₂ :C(C ₆ H ₅)CO ₂ H	162.08	69			
3595	C ₁₀ H ₁₀ O ₂	1-Benzylidenepropionic acid.....	162.08	74	288		
3596	C ₁₀ H ₁₀ O ₂	2-Benzylidenepropionic acid.....	162.08	86	302		
3597	C ₁₀ H ₁₀ O ₂	3-Phenylcrotonic acid.....	162.08	65			
3598	C ₁₀ H ₁₀ O ₂	Allyl benzoate C ₆ H ₅ CO ₂ C ₃ H ₇	162.08		230	1.058 ₁₅ ¹⁵	
3599	C ₁₀ H ₁₀ O ₂	Benzyl acrylate C ₆ H ₅ CO ₂ CH ₂ C ₃ H ₇	162.08		110 ⁸	1.069 ₄ ¹⁵	
3600	C ₁₀ H ₁₀ O ₂	Methyl cinnamate.....	162.08	36	259.6	1.042 ₀ ¹⁵	973
3601	C ₁₀ H ₁₀ O ₂	Phenylvinyl acetate.....	162.08		121 ¹⁰	1.065	999
3602	C ₁₀ H ₁₀ O ₂	<i>o</i> -Coniferylaldehyde.....	178.08	131			
3603	C ₁₀ H ₁₀ O ₂	<i>p</i> -Coniferylaldehyde.....	178.08	82.5			
3604	C ₁₀ H ₁₀ O ₂	<i>m</i> -Methoxycinnamic acid.....	178.08	115			
3605	C ₁₀ H ₁₀ O ₂	<i>p</i> -Methoxycinnamic acid.....	178.08	169			
3606	C ₁₀ H ₁₀ O ₂	Methyl benzoylacetate.....	178.08		265 d.	1.158	712
3607	C ₁₀ H ₁₀ O ₄	1-Benzoyllactic acid.....	194.08	112			
3608	C ₁₀ H ₁₀ O ₄	Benzylmalonic acid.....	194.08	117			
3609	C ₁₀ H ₁₀ O ₄	Ferulic acid.....	194.08	169			
3610	C ₁₀ H ₁₀ O ₄	Hesperetinic acid.....	194.08	228			
3611	C ₁₀ H ₁₀ O ₄	<i>o</i> -Phenylenediacetic acid.....	194.08	150			
3612	C ₁₀ H ₁₀ O ₄	<i>m</i> -Phenylenediacetic acid.....	194.08	170			
3613	C ₁₀ H ₁₀ O ₄	<i>p</i> -Phenylenediacetic acid.....	194.08	241			
3614	C ₁₀ H ₁₀ O ₄	Dimethyl isophthalate.....	194.08	68			
3615	C ₁₀ H ₁₀ O ₄	Dimethyl <i>o</i> -phthalate.....	194.08		282	1.189 ₂₅ ¹⁵	
3616	C ₁₀ H ₁₀ O ₄	Dimethyl terephthalate.....	194.08	140	> 300		
3617	C ₁₀ H ₁₀ O ₄	Ethyl hydrogen <i>o</i> -phthalate.....	194.08	48			
3618	C ₁₀ H ₁₀ O ₄	Hydroquinone diacetate.....	194.08	124			
3619	C ₁₀ H ₁₀ O ₄	Methyl acetylsalicylate.....	194.08	54			
3620	C ₁₀ H ₁₀ O ₄	Resorcinol diacetate.....	194.08		278 s. d.		
3621	C ₁₀ H ₁₀ O ₄	Meconin.....	194.08	101	155		
3622	C ₁₀ H ₁₀ O ₄	Salacetol <i>o</i> -HOC ₆ H ₄ CO ₂ CH ₂ COCH ₃ ...	194.08	71			
3623	C ₁₀ H ₁₀ O ₆	Larixinic acid.....	210.08	153			
3624	C ₁₀ H ₁₀ O ₆	Opianic acid.....	210.08	150			1333
3625	C ₁₀ H ₁₀ O ₆	Apiolic acid.....	226.08	175			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3626	C ₁₀ H ₁₀ O ₆	Hemipinic acid.....	226.08	186			
3627	C ₁₀ H ₁₁ NO ₂	Acetoacetanilide.....	177.09	85			
3628	C ₁₀ H ₁₁ NO ₂	Diacetanilide (CH ₃ CO) ₂ N.C ₆ H ₅	177.09	37	142 ¹¹		
3629	C ₁₀ H ₁₁ NO ₂	<i>p</i> -Diacetylaminophenol.....	193.09	118			
3630	C ₁₀ H ₁₁ NO ₃	Ethyl oxanilate.....	193.09	67	300		
3631	C ₁₀ H ₁₁ NO ₃	Methyl hippurate.....	193.09	80.5			
3632	C ₁₀ H ₁₁ NO ₃	<i>dl</i> -Benzoylalanine.....	193.09	166			
3635	C ₁₀ H ₁₁ NO ₄	Benzacetin.....	209.09	205			
3636	C ₁₀ H ₁₁ N ₂ O ₄	4-Nitro-1, 3-diacetylphenylenediamine.....	237.11	246			
3637	C ₁₀ H ₁₂	1, 2, 3, 4-Tetrahydronaphthalene.....	132.09		207.2	0.971	931
3638	C ₁₀ H ₁₂	5, 6, 7, 8-Tetrahydronaphthalene.....	132.09	-30	207	0.975	930
3639	C ₁₀ H ₁₂	β -Phenyl- β -butylene.....	132.09		189	0.901 ²¹	966
3640	C ₁₀ H ₁₂ Br ₂ O	2, 4-Dibromothymol.....	307.92	4	175 ²⁵	1.659 ^{17,4}	
3641	C ₁₀ H ₁₂ Br ₂ O ₂	Isoeugenol-1, 2-dibromide.....	323.92	102			
3642	C ₁₀ H ₁₂ N ₂	Isonicotine.....	160.11		293	1.098	760
3643	C ₁₀ H ₁₂ N ₂	Nicotine.....	160.11		267	1.078 ¹²	
3643.1	C ₁₀ H ₁₂ N ₂ O	1-Allyl-2-phenylurea.....	176.11	115.5			
3644	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>o</i> -phenylenediamine.....	192.11	186			
3645	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>m</i> -phenylenediamine.....	192.11	191			
3646	C ₁₀ H ₁₂ N ₂ O ₂	Diacetyl- <i>p</i> -phenylenediamine.....	192.11	160			
3647	C ₁₀ H ₁₂ N ₂ O ₃	5, 5-Diallylbarbituric acid.....	208.11	171			
3648	C ₁₀ H ₁₂ O	<i>p</i> -Anethol <i>p</i> -CH ₃ OC ₆ H ₄ CH:CHCH ₃	148.09	22.5	235.3	0.986	1044
3649	C ₁₀ H ₁₂ O	1, 2, 3, 4-Tetrahydro- α -naphthol.....	148.09		140 ¹⁷	1.090	917
3650	C ₁₀ H ₁₂ O	5, 6, 7, 8-Tetrahydro- α -naphthol.....	148.09	68	265.3		
3651	C ₁₀ H ₁₂ O	1, 2, 3, 4-Tetrahydro- β -naphthol.....	148.09		265.5	1.071	
3652	C ₁₀ H ₁₂ O	5, 6, 7, 8-Tetrahydro- β -naphthol.....	148.09	57.5	276		
3653	C ₁₀ H ₁₂ O	Benzyl allyl ether C ₆ H ₅ CH ₂ OC ₂ H ₅	148.09		204		
3654	C ₁₀ H ₁₂ O	Ethyl styryl ether C ₆ H ₅ CH:CHOC ₂ H ₅ ..	148.09		226	0.982	893
3655	C ₁₀ H ₁₂ O	Methyl chavicyl ether.....	148.09		216	0.965	676
3656	C ₁₀ H ₁₂ O	Cumic aldehyde (CH ₃) ₂ CHC ₆ H ₄ CHO....	148.09		235	0.978	698
3657	C ₁₀ H ₁₂ O	Mesitylinic aldehyde.....	148.09		237		
3658	C ₁₀ H ₁₂ O	3, 4, 5-Trimethylbenzaldehyde.....	148.09	52			
3659	C ₁₀ H ₁₂ O	Benzyl acetone C ₆ H ₅ (CH ₃) ₂ COCH ₃	148.09		236	0.989 ²⁴	
3660	C ₁₀ H ₁₂ O	Ethyl benzyl ketone.....	148.09		230.2	1.002 ²	
3661	C ₁₀ H ₁₂ O	Phenyl isopropyl ketone.....	148.09		217	0.984	879
3662	C ₁₀ H ₁₂ O	Phenyl <i>n</i> -propyl ketone.....	148.09	11	232.3	0.988	
3663	C ₁₀ H ₁₂ O	<i>p</i> -Tolylacetone.....	148.09	51	233		
3664	C ₁₀ H ₁₂ O	<i>p</i> -Tolyl ethyl ketone.....	148.09		239 ⁷⁸	0.993	690
3665	C ₁₀ H ₁₂ O ₂	3, 5, 6-Trimethyl-2-hydroxybenzaldehyde	164.09	106			
3666	C ₁₀ H ₁₂ O ₂	Eugenol.....	164.09		253	1.071 ¹⁸	841
3667	C ₁₀ H ₁₂ O ₂	Isoeugenol.....	164.09	-10	267.5	1.080	936
3668	C ₁₀ H ₁₂ O ₂	Cumic acid (CH ₃) ₂ CHC ₆ H ₄ CO ₂ H....	164.09	116.5		1.163 ⁴	
3669	C ₁₀ H ₁₂ O ₂	<i>o</i> -Isopropylbenzoic acid.....	164.09	51			
3670	C ₁₀ H ₁₂ O ₂	3-Phenylbutyric acid C ₆ H ₅ (CH ₂) ₃ CO ₂ H	164.09	47.5	290		
3671	C ₁₀ H ₁₂ O ₂	<i>o</i> -Propylbenzoic acid <i>o</i> -C ₆ H ₄ C ₃ H ₇ CO ₂ H.	164.09	58	273		
3672	C ₁₀ H ₁₂ O ₂	<i>p</i> -Propylbenzoic acid.....	164.09	141			
3673	C ₁₀ H ₁₂ O ₂	3, 4, 5-Trimethylbenzoic acid.....	164.06	215			
3674	C ₁₀ H ₁₂ O ₂	2, 4, 5-Trimethylbenzoic acid.....	164.09	149.5			
3675	C ₁₀ H ₁₂ O ₂	2, 4, 6-Trimethylbenzoic acid.....	164.09	152			
3676	C ₁₀ H ₁₂ O ₂	Benzyl propionate.....	164.09		220	1.036 ^{17,5}	
3677	C ₁₀ H ₁₂ O ₂	Ethyl phenylacetate C ₆ H ₅ CH ₂ CO ₂ C ₂ H ₅	164.09		226	1.031	589
3678	C ₁₀ H ₁₂ O ₂	Ethyl <i>o</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		221.3	1.033	629
3679	C ₁₀ H ₁₂ O ₂	Ethyl <i>m</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		226.4	1.028	624
3680	C ₁₀ H ₁₂ O ₂	Ethyl <i>p</i> -toluate CH ₃ C ₆ H ₄ CO ₂ C ₂ H ₅	164.09		228	1.026	636
3681	C ₁₀ H ₁₂ O ₂	Isopropyl benzoate.....	164.09		218.5	1.017 ¹⁴	
3681.1	C ₁₀ H ₁₂ O ₂	<i>d</i> -Methylbenzylcarbinyl formate.....	164.09		110 ¹⁹	1.027 ²²	595
3682	C ₁₀ H ₁₂ O ₂	Methyl hydrocinnamate.....	164.09		239	1.018 ¹⁹	
3683	C ₁₀ H ₁₂ O ₂	Phenyl <i>n</i> -butyrate C ₆ H ₅ CO ₂ C ₄ H ₉	164.09		228	1.027 ¹⁴	
3684	C ₁₀ H ₁₂ O ₂	<i>n</i> -Propyl benzoate C ₆ H ₅ CO ₂ C ₃ H ₇	164.09	-51.6	231.2	1.027	
3685	C ₁₀ H ₁₂ O ₂	Thymoquinone.....	164.09	45.5	232		
3686	C ₁₀ H ₁₂ O ₂	Coniferyl alcohol.....	180.09	74			
3687	C ₁₀ H ₁₂ O ₂	Benzyl lactate.....	180.09		130 ⁶		1025
3688	C ₁₀ H ₁₂ O ₂	Ethyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ C ₂ H ₅	180.09	7.8	263	1.106	680

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3689	C ₁₀ H ₁₂ O ₃	Ethyl mandelate.....	180.09	34	255		
3690	C ₁₀ H ₁₂ O ₃	Propyl salicylate <i>o</i> -HOC ₆ H ₄ CO ₂ C ₃ H ₇ ...	180.09		240	1.099 ¹⁵	
3691	C ₁₀ H ₁₂ O ₄	Cantharic acid.....	196.09	278			
3692	C ₁₀ H ₁₂ O ₄	Ethyl vanillate.....	196.09	44	293		
3693	C ₁₀ H ₁₂ O ₄	Cantharidin.....	196.09	212			
3694	C ₁₀ H ₁₂ O ₄	Guaiacyl methyl glycollate.....	196.09		156 ¹⁵	1.180	
3695	C ₁₀ H ₁₂ O ₄	Sparassol.....	196.09	68			
3696	C ₁₀ H ₁₂ O ₅	Asaronic acid.....	212.09	144	300		
3697	C ₁₀ H ₁₂ O ₅	Glycerol monosalicylate.....	212.09	76		1.366	
3698	C ₁₀ H ₁₂ O ₆	β -Anemoninic acid.....	228.09	189			
3699	C ₁₀ H ₁₃ ClO	4-Chlorothymol.....	184.56	64			
3700	C ₁₀ H ₁₃ ClO	6-Chlorothymol.....	184.56	64			
3701	C ₁₀ H ₁₃ N	Kairolin (1-Methyl-1, 2, 3, 4-tetrahydro-quinoline).....	147.11		245.5	1.021	1005
3702	C ₁₀ H ₁₃ N	5, 6, 7, 8-Tetrahydro- α -naphthylamine...	147.11		276.8	1.054 ^{28.1}	1006
3703	C ₁₀ H ₁₃ N	5, 6, 7, 8-Tetrahydro- β -naphthylamine...	147.11	38	278.5	1.029 ^{22.2}	986
3704	C ₁₀ H ₁₃ NO	<i>o</i> -Acetylmethyltoluidine.....	163.11	56			
3705	C ₁₀ H ₁₃ NO	<i>p</i> -Acetylmethyltoluidine.....	163.11	80			
3706	C ₁₀ H ₁₃ NO	<i>N</i> -Butyranilide C ₆ H ₅ NHOCC ₃ H ₇	163.11	92	189 ¹⁶		
3707	C ₁₀ H ₁₃ NO	3, 5-Dimethylacetanilide.....	163.11	174			
3708	C ₁₀ H ₁₃ NO	ω -Dimethylaminoacetophenone.....	163.11	59			
3709	C ₁₀ H ₁₃ NO	<i>N</i> -Ethylacetanilide.....	163.11	54.5	259	0.994 ⁴⁰	
3710	C ₁₀ H ₁₃ NO	Thalline.....	163.11	43	283.8		
3711	C ₁₀ H ₁₃ NO ₂	1-Anilinobutyric acid.....	179.11	141			
3712	C ₁₀ H ₁₃ NO ₂	Propyl <i>p</i> -aminobenzoate.....	179.11	76			
3713	C ₁₀ H ₁₃ NO ₂	<i>o</i> -Acetphenetidine.....	179.11	79	<250		
3714	C ₁₀ H ₁₃ NO ₂	<i>m</i> -Acetphenetidine.....	179.11	96			
3715	C ₁₀ H ₁₃ NO ₂	2-Nitrocymene.....	179.11		152 ¹⁵	1.085 ¹⁵	
3716	C ₁₀ H ₁₃ NO ₂	Phenacetin C ₆ H ₅ OC ₂ H ₄ NHCOCH ₃	179.11	135	d.		1246
3717	C ₁₀ H ₁₃ NO ₂	Damascenine.....	195.11	27	168		
3718	C ₁₀ H ₁₃ NO ₂	2-Nitrothymol.....	195.11	119			
3719	C ₁₀ H ₁₃ NO ₂	4-Nitrothymol.....	195.11	142			
3720	C ₁₀ H ₁₃ NO ₂	Ratanhine.....	195.11	252			
3721	C ₁₀ H ₁₃ NO ₂	Surinamine (<i>N</i> -Methyltyrosine).....	195.11	280 d.			
3722	C ₁₀ H ₁₃ N ₂ O ₄	2, 4-Dinitro- <i>N</i> -diethylaniline.....	239.12	80			
3723	C ₁₀ H ₁₃ N ₂ O ₄	Vernine.....	283.14	240			
3724	C ₁₀ H ₁₄	<i>n</i> -Butylbenzene CH ₃ (CH ₂) ₃ C ₆ H ₅	134.11		180	0.862	554
3725	C ₁₀ H ₁₄	<i>sec</i> -Butylbenzene C ₂ H ₅ (CH ₂)CHC ₆ H ₅ ...	134.11		175	0.860	550
3726	C ₁₀ H ₁₄	<i>tert</i> -Butylbenzene (CH ₃) ₃ C.C ₆ H ₅	134.11		168.7	0.867	582
3727	C ₁₀ H ₁₄	<i>o</i> -Cymene <i>o</i> -CH ₃ (CH ₂) ₂ C ₆ H ₄ CH ₃	134.11		157	0.858 ¹⁸	601
3728	C ₁₀ H ₁₄	<i>m</i> -Cymene <i>m</i> -CH ₃ (CH ₂) ₂ C ₆ H ₄ CH ₃	134.11	> -25	175	0.860	559
3728.1	C ₁₀ H ₁₄	<i>p</i> -Cymene <i>p</i> -CH ₃ (CH ₂) ₂ C ₆ H ₄ CH ₃	134.11	-73.5	176	0.857	1022
3729	C ₁₀ H ₁₄	<i>o</i> -Diethylbenzene <i>o</i> -(C ₂ H ₅) ₂ C ₆ H ₄	134.11	< -20	184.5	0.866	
3730	C ₁₀ H ₁₄	<i>m</i> -Diethylbenzene <i>m</i> -(C ₂ H ₅) ₂ C ₆ H ₄	134.11	< -20	182	0.860	
3731	C ₁₀ H ₁₄	<i>p</i> -Diethylbenzene <i>p</i> -(C ₂ H ₅) ₂ C ₆ H ₄	134.11	-35	183	0.865	569.1
3732	C ₁₀ H ₁₄	1, 2, 4, 5-Tetramethylbenzene.....	134.11	80	195	0.838 ^{31.3}	1273
3733	C ₁₀ H ₁₄	4-Ethyl- <i>m</i> -xylene C ₂ H ₅ C ₆ H ₃ (CH ₃) ₂	134.11	< -20	183	0.878	
3734	C ₁₀ H ₁₄	5-Ethyl- <i>m</i> -xylene C ₂ H ₅ C ₆ H ₃ (CH ₃) ₂	134.11	< -20	185	0.861	
3735	C ₁₀ H ₁₄	Hexahydronaphthalene.....	134.11		205.5	0.934	
3736	C ₁₀ H ₁₄	Isobutylbenzene (CH ₃) ₂ CHCH ₂ C ₆ H ₅ ...	134.11		171.4	0.858 ¹⁶	562
3739	C ₁₀ H ₁₄	1, 2, 3, 5-Tetramethylbenzene.....	134.11		197	0.896 ⁹	
3740	C ₁₀ H ₁₄	1, 2, 3, 4-Tetramethylbenzene.....	134.11	-4	204	0.901	662
3741	C ₁₀ H ₁₄	Verbenene.....	134.11		159	0.886 ¹⁵	593
3742	C ₁₀ H ₁₄ Br ₂ O	<i>d</i> - α , α' -Dibromocamphor.....	309.94	61			1209
3743	C ₁₀ H ₁₄ ClN	Thermin (Tetrahydro- β -naphthylamine hydrochloride).....	133.57	237			
3744	C ₁₀ H ₁₄ Cl ₂ O	α -Dichlorocamphor.....	221.02	96	200 d.	4.2	
3745	C ₁₀ H ₁₄ Cl ₂ O	β -Dichlorocamphor.....	221.02	77			
3746	C ₁₀ H ₁₄ N ₂	Isonicotine.....	162.12	78	260 d.		
3747	C ₁₀ H ₁₄ N ₂	Nicotine.....	162.12		274.3	1.009	695
3748	C ₁₀ H ₁₄ N ₂	Nicotimine.....	162.12		250		
3749	C ₁₀ H ₁₄ N ₂ O ₂	6-Nitroso-3-(diethylamino) phenol.....	194.12	84			
3750	C ₁₀ H ₁₄ N ₂ O	<i>p</i> -Nitroso- <i>N</i> -diethylaniline.....	178.12	84			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3751	C ₁₀ H ₁₄ N ₂ O ₂	Phenocoll <i>p</i> -C ₂ H ₅ OC ₆ H ₄ NHCOCH ₂ NH ₂	194.12	100.5			
3752	C ₁₀ H ₁₄ O	Carvacrol.....	150.11	0.5	237.9	0.976	678
3753	C ₁₀ H ₁₄ O	<i>d</i> -Carvol.....	150.11		225	0.960	940
3754	C ₁₀ H ₁₄ O	Cuminal alcohol.....	150.11		246.6	0.978 ¹⁶	
3754.1	C ₁₀ H ₁₄ O	Methyl <i>d</i> -methylbenzyl carbinol.....	150.11		85 ¹²	0.927 ²⁷	
3754.2	C ₁₀ H ₁₄ O	Methyl <i>l</i> -phenylethyl carbinol.....	150.11		132 ¹⁴	0.9767	658
3755	C ₁₀ H ₁₄ O	3-Methyl-2-hydroxyisopropylbenzene....	150.11		226	0.987 ¹⁵⁻²	669
3756	C ₁₀ H ₁₄ O	Thymol (CH ₃) ₂ CHC ₆ H ₄ (OH)CH ₃	150.11	51.5	231.8	0.969	1170
3757	C ₁₀ H ₁₄ O	5-Methyl-2-hydroxyisopropylbenzene....	150.11	36	229	0.982 ¹⁷⁻⁸	674
3758	C ₁₀ H ₁₄ O	Benzyl propyl ether C ₆ H ₅ CH ₂ OC ₃ H ₇	150.11		196		
3759	C ₁₀ H ₁₄ O	<i>n</i> -Butyl phenyl ether C ₆ H ₅ OC ₄ H ₉	150.11		210.3	0.950 ⁹	
3760	C ₁₀ H ₁₄ O	Isobutyl phenyl ether.....	150.11		198	0.939 ¹⁶	
3761	C ₁₀ H ₁₄ O	Myrtenal (Myrtenic aldehyde).....	150.11		90 ¹⁰	0.988	616
3762	C ₁₀ H ₁₄ O	Eucarvol.....	150.11		106 ²⁰	0.952	845
3763	C ₁₀ H ₁₄ O	Pinocarvol.....	150.11		224	0.984	620
3764	C ₁₀ H ₁₄ O	<i>d</i> (<i>l</i>)-Piperitone.....	150.11		235	0.934 ^{vac.}	542
3765	C ₁₀ H ₁₄ O	Umbellulone.....	150.11		220	0.958	551
3766	C ₁₀ H ₁₄ O ₂	<i>o</i> -Diethoxybenzene <i>o</i> -(C ₂ H ₅ O) ₂ C ₆ H ₄	166.11	45			
3767	C ₁₀ H ₁₄ O ₂	Coërolignol.....	166.11		246	1.049 ¹⁵	
3768	C ₁₀ H ₁₄ O ₂	Hydroquinone diethyl ether.....	166.11	72			
3769	C ₁₀ H ₁₄ O ₂	Resorcinol diethyl ether.....	166.11	12.4	235.2		
3770	C ₁₀ H ₁₄ O ₂	<i>d</i> -Camphorquinone.....	166.11	198			
3771	C ₁₀ H ₁₄ O ₂	Thymohydroquinone.....	166.11	143	290		
3772	C ₁₀ H ₁₄ O ₂	Crocetin.....	166.11	104			
3773	C ₁₀ H ₁₄ O ₂	<i>dl</i> -Camphoric anhydride.....	182.11	221	270		
3774	C ₁₀ H ₁₄ O ₄	1, 2, 3, 5-Tetramethoxybenzene.....	198.11	47	271		
3775	C ₁₀ H ₁₄ O ₄	Guaiamar.....	198.11	75			
3776	C ₁₀ H ₁₄ O ₄	Diethyl muconate.....	198.11	13; 62	64	0.983 ²⁹⁻¹	
3777	C ₁₀ H ₁₄ O ₆	Pinoylformic acid.....	214.11	80			
3777.1	C ₁₀ H ₁₄ O ₆	Diallyl tartrate.....	230.11		191 ²⁰	1.187 ²⁶⁻⁶	
3778	C ₁₀ H ₁₄ BrO	α -Bromocamphor.....	231.03	78	274	1.449	1252
3779	C ₁₀ H ₁₄ BrO	β -Bromocamphor.....	231.03	61	130 ¹⁰		
3780	C ₁₀ H ₁₄ Cl	Myrtenyl chloride.....	170.57		90 ¹²	1.015	586
3782	C ₁₀ H ₁₄ ClO	α -Chlorocamphor.....	186.57	125	220 s. d.		
3783	C ₁₀ H ₁₄ ClO	β -Chlorocamphor.....	186.57	92.5	247		
3784	C ₁₀ H ₁₄ ClO	γ -Chlorocamphor.....	186.57	100	237 s. d.		
3785	C ₁₀ H ₁₄ N	<i>n</i> -Butylaniline C ₆ H ₅ NHC ₄ H ₉	149.12		240.9		
3786	C ₁₀ H ₁₄ N	2-Dimethylamino- <i>m</i> -xylene.....	149.12		196.2	0.915	649
3787	C ₁₀ H ₁₄ N	4-Dimethylamino- <i>m</i> -xylene.....	149.12		232.2	0.939	730
3788	C ₁₀ H ₁₄ N	4-Dimethylamino- <i>o</i> -xylene.....	149.12		205	0.916	663
3789	C ₁₀ H ₁₄ N	Diethylaniline C ₆ H ₅ N(C ₂ H ₅) ₂	149.12	-34.4	216.27	0.934	717
3790	C ₁₀ H ₁₄ N	Isobutylaniline C ₆ H ₅ NHCH ₂ CH(CH ₃) ₂	149.12		242	0.940	
3791	C ₁₀ H ₁₄ N	Prehnidine 1, 2, 3, 4-C ₆ H ₂ (CH ₃) ₄	149.12	70	260		
3792	C ₁₀ H ₁₄ NO	<i>m</i> -Diethylaminophenol.....	165.12	78	278		
3793	C ₁₀ H ₁₄ NO	Ephedrine.....	165.12	40	255		
3794	C ₁₀ H ₁₄ NO	Hordenine.....	165.12	118	174 ¹¹		
3795	C ₁₀ H ₁₄ NO	Pseudoephedrine.....	165.12	117			
3796	C ₁₀ H ₁₄ NO ₂ S	Diethylaniline- <i>m</i> -sulfonic acid.....	229.19	270 d.			
3797	C ₁₀ H ₁₄ N ₂ O ₅	Pilocarpidine nitrate.....	257.14	137			1333
3800	C ₁₀ H ₁₆	<i>l</i> -Bornylene.....	136.12	111	147		
3801	C ₁₀ H ₁₆	<i>dl</i> -Camphene.....	136.12	50	160	0.822	1116
3802	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Camphene.....	136.12	42.7	159		1074
3803	C ₁₀ H ₁₆	Camphilene.....	136.12		156	0.87 ¹⁶	
3804	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)- Δ^4 -Carene.....	136.12		167 ⁷⁰⁷	0.855 ²⁰	1037
3805	C ₁₀ H ₁₆	Cyclofenchene.....	136.12		144	0.861	445
3806	C ₁₀ H ₁₆	Dipentene.....	136.12		176	0.865 ¹⁸	515
3807	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Fenchene.....	136.12		150	0.869	955
3808	C ₁₀ H ₁₆	Fenchylene.....	136.12		142	0.840	435
3809	C ₁₀ H ₁₆	Geraniene.....	136.12		164	0.843	
3810	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Limonene.....	136.12	-96.9	177	0.842	510
3811	C ₁₀ H ₁₆	Myrcene.....	136.12		167	0.802	503
3812	C ₁₀ H ₁₆	Ocimene.....	136.12		74 ²¹	0.799	835
3813	C ₁₀ H ₁₆	<i>cis</i> - β -Octalin.....	136.12		73 ¹⁵	0.915	984

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3814	C ₁₀ H ₁₆	<i>trans</i> -β-Octalin.....	136.12		190	0.909 ¹³	
3815	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-α-Phellandrene.....	136.12		175	0.843	983
3816	C ₁₀ H ₁₆	β-Phellandrene.....	136.12		171	0.852	527
3817	C ₁₀ H ₁₆	<i>dl</i> -α-Pinene.....	136.12	-55	154	0.878	
3818	C ₁₀ H ₁₆	<i>l</i> -β-Pinene.....	136.12		164	0.873 ¹⁵	824
3819	C ₁₀ H ₁₆	Sabinene.....	136.12		165	0.842	914
3820	C ₁₀ H ₁₆	<i>d</i> (<i>l</i>)-Sylvestrene.....	136.12		177	0.863	919
3821	C ₁₀ H ₁₆	α-Terpinene.....	136.12		175	0.834	915
3822	C ₁₀ H ₁₆	β-Terpinene.....	136.12		174	0.840	982
3823	C ₁₀ H ₁₆	Δ ^{1,6} -Terpinene.....	136.12		182	0.855	541
3824	C ₁₀ H ₁₆	Terpinolene.....	136.12		185	0.855	537
3825	C ₁₀ H ₁₆	Terpinylene.....	136.12		175		
3826	C ₁₀ H ₁₆	α-Thujene.....	136.12		151	0.830	440
3827	C ₁₀ H ₁₆	β-Thujene.....	136.12		147.7	0.821	420
3828	C ₁₀ H ₁₆ ClNO	Ephedrine hydrochloride.....	201.59	210			
3829	C ₁₀ H ₁₆ ClNO	α-Limonene nitrosylchloride.....	201.60	104			
3830	C ₁₀ H ₁₆ ClNO	Pseudoephedrine hydrochloride.....	201.59	175			
3831	C ₁₀ H ₁₆ Cl ₂	α-Camphordichloride.....	207.04	148			
3832	C ₁₀ H ₁₆ Cl ₂	β-Camphordichloride.....	207.04	178			
3833	C ₁₀ H ₁₆ N ₂	<i>p</i> -Aminodiethylaniline.....	164.14		262		
3834	C ₁₀ H ₁₆ N ₂	<i>o</i> -Tetramethylphenylenediamine.....	164.14		218		
3835	C ₁₀ H ₁₆ N ₂	<i>m</i> -Tetramethylphenylenediamine.....	164.14	-2	262	0.988 ^{15,8}	
3836	C ₁₀ H ₁₆ N ₂	<i>p</i> -Tetramethylphenylenediamine.....	164.14	51	260		
3837	C ₁₀ H ₁₆ N ₂ O ₂	α-Camphordioxime.....	196.14	182 d.			
3838	C ₁₀ H ₁₆ N ₂ O ₂	γ-Camphordioxime.....	196.14	132			
3839	C ₁₀ H ₁₆ N ₂ O ₂	5, 5- <i>n</i> -Butylethylbarbituric acid.....	212.14	128			
3840	C ₁₀ H ₁₆ N ₂ O ₂	5, 5- <i>sec</i> .-Butylethylbarbituric acid.....	212.14	157			
3841	C ₁₀ H ₁₆ N ₂ O ₂	5, 5-Dipropylbarbituric acid.....	212.14	145			
3842	C ₁₀ H ₁₆ N ₂ O ₂	5, 5-Isobutylethylbarbituric acid.....	212.14	176			
3843	C ₁₀ H ₁₆ N ₂ O ₂	5, 5- <i>n</i> -Propylisopropylbarbituric acid.....	212.14	162			
3844	C ₁₀ H ₁₆ O	Alantol.....	152.12		200		
3845	C ₁₀ H ₁₆ O	<i>dl</i> -Camphor.....	152.12	174			
3846	C ₁₀ H ₁₆ O	<i>d</i> -Camphor.....	152.12	179	209.1	0.990 ²⁵	
3847	C ₁₀ H ₁₆ O	Carvenone.....	152.12		233	0.926	897
3848	C ₁₀ H ₁₆ O	Caryophyllin.....	152.12	295			
3849	C ₁₀ H ₁₆ O	α-Citral.....	152.12		229	0.893 ¹⁵	920
3850	C ₁₀ H ₁₆ O	β-Citral.....	152.12		104 ¹²	0.888	956
3851	C ₁₀ H ₁₆ O	Cyclocitral.....	152.12		114 ²⁹	0.957 ¹⁵	825
3852	C ₁₀ H ₁₆ O	<i>d</i> -Fenchone.....	152.12	6	195	0.944	839
3853	C ₁₀ H ₁₆ O	Hartin.....	152.12	230		1.120	
3854	C ₁₀ H ₁₆ O	Isopulegon.....	152.12		90 ¹²	0.921 ^{17,5}	499
3855	C ₁₀ H ₁₆ O	Myristicol.....	152.12		218		
3856	C ₁₀ H ₁₆ O	Myrtenol.....	152.12		224	0.976	581
3857	C ₁₀ H ₁₆ O	Phellandral.....	152.12		230	0.945	553
3858	C ₁₀ H ₁₆ O	Pinol.....	152.12		184	0.942	507
3859	C ₁₀ H ₁₆ O	Pulegon.....	152.12		224	0.937	861
3860	C ₁₀ H ₁₆ O	Sabinol.....	152.12		209	0.943	546
3861	C ₁₀ H ₁₆ O	α-Thujone.....	152.12		200	0.913	827
3862	[C ₁₀ H ₁₆ O] _x	Urson.....	[152.12] _x	264			
3863	C ₁₀ H ₁₆ O ₂	Acetylmethylheptenone.....	168.12	-6	234	0.945 ¹⁵	860
3864	C ₁₀ H ₁₆ O ₂	Ascaridol.....	168.12		84 ⁵	1.008 ¹⁵	518
3865	C ₁₀ H ₁₆ O ₂	Geranic acid.....	168.12		119 ²⁰	0.952	544
3866	C ₁₀ H ₁₆ O ₂	Hydroxycamphor.....	168.12	205			
3867	C ₁₀ H ₁₆ O ₂	<i>d</i> (<i>l</i>)-Pinonic acid.....	184.12	99	180 ¹²		
3867.1	C ₁₀ H ₁₆ O ₂	<i>dl</i> -Pinonic acid.....	184.12	105		1.216	
3868	C ₁₀ H ₁₆ O ₄	<i>dl</i> -Camphoric acid.....	200.12	202			
3869	C ₁₀ H ₁₆ O ₄	<i>d</i> -Camphoric acid.....	200.12	187			
3870	C ₁₀ H ₁₆ O ₄	Cyclohexyl acid succinate.....	200.12	44			
3871	C ₁₀ H ₁₆ O ₄	<i>dl</i> -Isocamphoric acid.....	200.12	191			
3872	C ₁₀ H ₁₆ O ₄	<i>d</i> -Methyl pinate.....	200.12		130 ⁹	1.055	
3873	C ₁₀ H ₁₆ O ₆	<i>l</i> -Cineolic acid.....	216.12	196			1325
3874	C ₁₀ H ₁₆ O ₆	Diethyl acetylsuccinate.....	216.12		256 d.	1.081	884
3875	C ₁₀ H ₁₇ Br	<i>d</i> -Pinene hydrobromide.....	217.05	80			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3876	C ₁₀ H ₁₇ Cl	Camphene hydrochloride.....	172.59	156.5			
3877	C ₁₀ H ₁₇ Cl	<i>cis</i> -β-Chlorodecalin.....	172.59		112 ¹⁵		
3878	C ₁₀ H ₁₇ Cl	Fenchyl chloride.....	172.59		85 ¹⁴	0.983	
3879	C ₁₀ H ₁₇ Cl	Geranyl chloride.....	172.59		103 ¹⁴	0.918 ²⁵	517
3880	C ₁₀ H ₁₇ Cl	Isobornyl chloride.....	172.59	161.5			
3881	C ₁₀ H ₁₇ Cl	<i>d</i> -Pinene hydrochloride.....	172.59	128	207.4		
3882	C ₁₀ H ₁₇ N	Camphenamine.....	151.14		205.5	0.940	564
3883	C ₁₀ H ₁₇ N	Pinyllamine.....	151.14		207	0.940	613
3884	C ₁₀ H ₁₇ NO	Camphoroxime.....	167.14	119.5	249		
3885	C ₁₀ H ₁₇ NO	<i>d</i> -Fenchoneoxime.....	167.14	165	240		
3886	C ₁₀ H ₁₇ NO ₂	<i>l</i> -Ecgonine methyl ester.....	199.14			1.147	547
3886.1	C ₁₀ H ₁₇ NO ₂	<i>dl</i> -α-Pinone oxime.....	199.14	150		1.210	
3887	C ₁₀ H ₁₇ NO ₂	Phaseolunatin.....	247.14	144			
3888	C ₁₀ H ₁₈	Camphane.....	138.14	152	160		
3889	C ₁₀ H ₁₈	Carane.....	138.14		50 ⁹	0.838 ²⁰	459
3890	C ₁₀ H ₁₈	<i>cis</i> -Decahydronaphthalene.....	138.14	-125	193.3	0.898	539
3891	C ₁₀ H ₁₈	<i>trans</i> -Decahydronaphthalene.....	138.14		185.3	0.872	504
3892	C ₁₀ H ₁₈	<i>d</i> -Menthene.....	138.14		168	1.4481	423
3893	C ₁₀ H ₁₈	<i>d</i> -Pinane.....	138.14	-45	169.4	0.839	448
3894	C ₁₀ H ₁₈	Pinocamphane.....	138.14		164.9	0.856	477
3895	C ₁₀ H ₁₈	Thujane.....	138.14		157	0.814	363
3896	C ₁₀ H ₁₈ Cl ₂ N ₂	<i>o</i> -Tetramethylphenylenediamine hydrochloride.....	237.07	180			
3897	C ₁₀ H ₁₈ O	Apopinol.....	154.14		199	0.894 ¹⁸	
3899	C ₁₀ H ₁₈ O	Aurantiol.....	154.14		95 ¹⁵	0.869 ²⁰	
3900	C ₁₀ H ₁₈ O	<i>dl</i> -Borneol.....	154.14	210.5			
3901	C ₁₀ H ₁₈ O	<i>d</i> (<i>l</i>)-Borneol.....	154.14	208.6	213.5	1.011	
3902	C ₁₀ H ₁₈ O	Cineol.....	154.14	-1	176.4	0.901 ¹⁸	474
3903	C ₁₀ H ₁₈ O	<i>d</i> -Citronellal.....	154.14		208	0.856	
3904	C ₁₀ H ₁₈ O	<i>dl</i> -Fenchyl alcohol.....	154.14	33	204.6	0.953	
3905	C ₁₀ H ₁₈ O	<i>dl</i> , (<i>d</i>)-Fenchyl alcohol.....	154.14	42	201	0.935 ⁴⁰	
3906	C ₁₀ H ₁₈ O	<i>dl</i> , (<i>l</i>)-Fenchyl alcohol.....	154.14	47	201	0.933 ⁴⁰	
3907	C ₁₀ H ₁₈ O	<i>d</i> , (<i>l</i>)-Fenchyl alcohol.....	154.14	49	209		
3908	C ₁₀ H ₁₈ O	Geraniol.....	154.14	< -15	229	0.881	531
3909	C ₁₀ H ₁₈ O	<i>dl</i> -Isoborneol.....	154.14	212			
3910	C ₁₀ H ₁₈ O	<i>d</i> (<i>l</i>)-Isoborneol.....	154.14	216			
3911	C ₁₀ H ₁₈ O	<i>dl</i> -Isosfenchyl alcohol.....	154.14		204		
3912	C ₁₀ H ₁₈ O	<i>l</i> -Isosfenchyl alcohol.....	154.14	62	202	0.961 ¹⁵	859
3913	C ₁₀ H ₁₈ O	Isopulegol.....	154.14		102 ¹²	0.915	513
3913.1	C ₁₀ H ₁₈ O	<i>l</i> -Isopulegol.....	154.14		94 ¹⁴	0.9110	509
3914	C ₁₀ H ₁₈ O	Lavendol.....	154.14		199	0.873 ¹⁵	
3915	C ₁₀ H ₁₈ O	<i>d</i> -Linalool.....	154.14		198.3	0.875	480
3916	C ₁₀ H ₁₈ O	<i>l</i> -Linalool.....	154.14		195	0.866 ¹⁵	981
3917	C ₁₀ H ₁₈ O	<i>dl</i> -Menthone.....	154.14		210	0.897	441
3918	C ₁₀ H ₁₈ O	<i>l</i> -Menthone.....	154.14		207	0.896	
3919	C ₁₀ H ₁₈ O	Myrcenol.....	154.14		101 ¹⁰	0.901 ^{14.5}	840
3920	C ₁₀ H ₁₈ O	Nerol.....	154.14		225.2	0.881	
3921	C ₁₀ H ₁₈ O	Pinen hydrate (Homopinol).....	154.14	59	205		
3922	C ₁₀ H ₁₈ O	<i>dl</i> , α-Terpineol.....	154.14	35	219.8	0.936	538
3923	C ₁₀ H ₁₈ O	<i>d</i> (<i>l</i>), α-Terpineol.....	154.14	40	217.7	0.919	890
3924	C ₁₀ H ₁₈ O	β-Terpineol.....	154.14	33	210.3	0.819 ²⁰	521
3925	C ₁₀ H ₁₈ O	γ-Terpineol.....	154.14	70			
3926	C ₁₀ H ₁₈ O	<i>dl</i> -Terpinen-4-ol.....	154.14		214	0.929	533
3927	C ₁₀ H ₁₈ O	<i>d</i> -Terpinen-4-ol (Origanol).....	154.14		212	0.926	526
3928	C ₁₀ H ₁₈ O	Thujyl alcohol.....	154.14		212	0.921	923
3929	C ₁₀ H ₁₈ O ₂	Acetylmethyl hexyl ketone.....	170.14	-6	237 d.	0.907 ²⁵	
3930	C ₁₀ H ₁₈ O ₂	<i>d</i> (<i>l</i>)-Campholic acid.....	170.14	107	260		
3931	C ₁₀ H ₁₈ O ₂	<i>d</i> -Citronellic acid.....	170.14		257	0.931	
3932	C ₁₀ H ₁₈ O ₂	9, 10-Decylenic acid.....	170.14	<0	142 ⁴		
3933	C ₁₀ H ₁₈ O ₂	Fencholic acid.....	170.14	18	255	0.970 ^{18.9}	462
3934	C ₁₀ H ₁₈ O ₃	Pinol glycol.....	186.14	129			
3935	C ₁₀ H ₁₈ O ₃	<i>n</i> -Valeric anhydride (C ₄ H ₇ CO) ₂ O.....	186.14		215	0.929	
3936	C ₁₀ H ₁₈ O ₃	Isovaleric anhydride.....	186.14		215	0.933	229

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3937	C ₁₀ H ₁₈ O ₂	Ethyl diethylacetoacetate.....	186.14		158.2	1.282	327
3938	C ₁₀ H ₁₈ O ₄	Sebacic acid HO ₂ C(CH ₂) ₈ CO ₂ H.....	202.14	127	294.5 ¹⁰⁰		1161
3939	C ₁₀ H ₁₈ O ₄	Isoamyl ethyl malonate.....	202.14		150 ²⁰	0.954 ²⁵	306
3940	C ₁₀ H ₁₈ O ₄	<i>n</i> -Butyl isopropylmalonate.....	202.14		136 ¹⁴	0.974 ²⁵	331
3941	C ₁₀ H ₁₈ O ₄	Di- <i>n</i> -butyl oxalate (CO ₂ C ₄ H ₉) ₂	202.14		243.4	1.0108	
3942	C ₁₀ H ₁₈ O ₄	Diisobutyl oxalate.....	202.14		229	1.002 ¹⁴	
3943	C ₁₀ H ₁₈ O ₄	Dipropyl succinate.....	202.14		250.8	1.006 ¹⁶	
3944	C ₁₀ H ₁₈ O ₅	Dipropyl malate.....	218.14	10.5	151 ¹⁰	1.075	366
3945	C ₁₀ H ₁₈ O ₅	Dipropyl <i>d</i> -tartrate [HOCHCO ₂ C ₃ H ₇] ₂ ..	234.14		303	1.139	
3945.1	C ₁₀ H ₁₈ O ₅	Di- <i>sec</i> -propyl tartrate.....	234.14		158 ¹⁶	1.116 ^{13.7}	
3946	C ₁₀ H ₁₈ O ₉	Arabin.....	282.14	260			
3947	C ₁₀ H ₁₉ Cl	<i>sec</i> -Menthyl chloride.....	174.60		215	0.941	485
3948	C ₁₀ H ₁₉ Cl	<i>tert</i> -Menthyl chloride.....	174.60		94 ^{18.5}	0.948	488
3949	C ₁₀ H ₁₉ N	Bornylamine.....	153.15	163	200		
3950	C ₁₀ H ₁₉ N	Camphylamine.....	153.15		198		
3951	C ₁₀ H ₁₉ N	<i>l</i> -Fenchylamine.....	153.15		195	0.910 ²²	
3952	C ₁₀ H ₁₉ N	Geranylamine.....	153.15		105 ¹⁹	0.829 ²⁵	511
3953	C ₁₀ H ₁₉ NO	Lupinine.....	169.15	68	257		
3954	C ₁₀ H ₁₉ NO ₂	Sebamic acid.....	201.15	170			
3955	C ₁₀ H ₂₀	α -Decylene CH ₂ :CH(CH ₂) ₇ CH ₃	140.15		172	0.763 ⁹	912
3956	C ₁₀ H ₂₀	γ -Decylene C ₂ H ₇ :CH:CHC ₆ H ₁₁	140.15		161		
3957	C ₁₀ H ₂₀	2, 3-Dimethyl-2-octene.....	140.15		162 ⁸⁵⁰	0.748	
3958	C ₁₀ H ₂₀	2, 6-Dimethyl-1(2)-octene.....	140.15		169	0.789 ⁹	993
3959	C ₁₀ H ₂₀	<i>o</i> -Menthane.....	140.15		171	0.814	965
3960	C ₁₀ H ₂₀	<i>m</i> -Menthane.....	140.15		168.2	0.790	387
3961	C ₁₀ H ₂₀	<i>p</i> -Menthane.....	140.15		170	0.793	358
3962	C ₁₀ H ₂₀	2-Methyl-5-ethyl-5-heptene.....	140.15		158.4	0.761 ⁹	302
3963	C ₁₀ H ₂₀	3, 3, 5-Trimethyl-4-heptene.....	140.15		157.5	0.788 ⁹	
3964	C ₁₀ H ₂₀ ClNO	Lupinine hydrochloride.....	205.62	213			1244
3965	C ₁₀ H ₂₀ N ₂ O ₆	Lycetol (Dimethylpiperazine tartrate)...	264.17	250			
3966	C ₁₀ H ₂₀ O	α -Carvacromenthol.....	156.15		219		
3967	C ₁₀ H ₂₀ O	β -Carvacromenthol.....	156.15		222	0.918 ⁹	
3968	C ₁₀ H ₂₀ O	<i>d</i> -Citronellol.....	156.15		221.7	0.857 ¹⁵	410
3969	C ₁₀ H ₂₀ O	<i>l</i> -Citronellol.....	156.15		114 ¹⁵	0.861	464
3970	C ₁₀ H ₂₀ O	<i>d</i> -Isomenthol.....	156.15	83			
3971	C ₁₀ H ₂₀ O	<i>o</i> -Menthan-2-ol.....	156.15		95 ²⁵		
3972	C ₁₀ H ₂₀ O	<i>p</i> -Menthan-8-ol.....	156.15	36	207.4		
3973	C ₁₀ H ₂₀ O	<i>l</i> - α -Menthol.....	156.15	42.5	212	0.890 ¹⁵	1168
3974	C ₁₀ H ₂₀ O	<i>l</i> - β -Menthol.....	156.15	35.5	212	0.890 ¹⁵	
3974.1	C ₁₀ H ₂₀ O	<i>l</i> -Neomenthol.....	156.15	< -15	105 ²¹	0.8995	473
3975	C ₁₀ H ₂₀ O	<i>n</i> -Capric aldehyde CH ₃ (CH ₂) ₈ CHO.....	156.15		209.2	0.828 ¹⁶	307
3976	C ₁₀ H ₂₀ O	Isocapric aldehyde.....	156.15		169.6	0.828 ⁹	
3977	C ₁₀ H ₂₀ O	Isopropyl <i>n</i> -hexyl ketone.....	156.15		210	0.841 ¹⁷	
3978	C ₁₀ H ₂₀ O	Methyl <i>n</i> -octyl ketone CH ₃ COC ₈ H ₁₇ ...	156.15	3.5	211	0.825	
3978.1	C ₁₀ H ₂₀ O	Propyl hexyl ketone C ₃ H ₇ COC ₆ H ₁₃ ...	156.15	-9	207	0.824	
3979	C ₁₀ H ₂₀ O ₂	<i>cis</i> -Terpine.....	172.15	104.7	258		
3980	C ₁₀ H ₂₀ O ₂	<i>trans</i> -Terpine.....	172.15	158	265		
3981	C ₁₀ H ₂₀ O ₂	<i>n</i> -Capric acid CH ₃ (CH ₂) ₈ CO ₂ H.....	172.15	31	268.4	0.895 ²⁰	1038
3981.1	C ₁₀ H ₂₀ O ₂	Di- <i>n</i> -butylacetic acid.....	172.15		140 ¹⁶	0.898 ^{18.4}	
3982	C ₁₀ H ₂₀ O ₂	<i>n</i> -Amyl valerate C ₆ H ₁₃ CO ₂ C ₅ H ₁₁	172.15		203.7	0.881 ⁹	213
3983	C ₁₀ H ₂₀ O ₂	<i>n</i> -Butyl caproate C ₆ H ₁₃ CO ₂ C ₄ H ₉	172.15		204.3	0.882 ⁹	
3984	C ₁₀ H ₂₀ O ₂	Ethyl <i>n</i> -caprylate C ₇ H ₁₅ CO ₂ C ₂ H ₅	172.15	-44.8	205.8	0.878 ¹⁷	
3985	C ₁₀ H ₂₀ O ₂	<i>n</i> -Heptyl propionate C ₇ H ₁₅ CO ₂ C ₃ H ₇	172.15		208	0.885 ⁹	
3986	C ₁₀ H ₂₀ O ₂	Isoamyl isovalerate.....	172.15		194	0.870 ⁹	198
3987	C ₁₀ H ₂₀ O ₂	Methyl pelargonate C ₈ H ₁₇ CO ₂ CH ₃	172.15		214	0.877 ^{17.6}	
3988	C ₁₀ H ₂₀ O ₂	<i>d</i> - γ -Nonyl formate.....	172.15		95 ²²	0.869	258
3989	C ₁₀ H ₂₀ O ₂	<i>n</i> -Octyl acetate CH ₃ CO ₂ C ₈ H ₁₇	172.15	-38.5	210	0.885 ⁹	250
3991	C ₁₀ H ₂₀ O ₃	1-Hydroxycapric acid.....	188.15	70.5			
3992	C ₁₀ H ₂₁ N	<i>l</i> -Menthylamine.....	155.17		208.2	0.860	475
3993	C ₁₀ H ₂₂	<i>n</i> -Decane CH ₃ (CH ₂) ₈ CH ₃	142.17	-32.0	174	0.747	220
3994	C ₁₀ H ₂₂	2, 6-Dimethyloctane.....	142.17		159	0.734	185
3995	C ₁₀ H ₂₂	2, 7-Dimethyloctane.....	142.17	-52.8	160	0.722	171
3996	C ₁₀ H ₂₂	<i>dl</i> , 3, 6-Dimethyloctane.....	142.17		162		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
3997	C ₁₀ H ₂₂	<i>d</i> , 3, 6-Dimethyloctane.....	142.17		160.8	0.735 ¹³	
3998	C ₁₀ H ₂₂	2-Methylnonane (CH ₃) ₂ CH(CH ₂) ₆ CH ₃ ..	142.17		160	0.728 ^{15,1}	174
3999	C ₁₀ H ₂₂	3-Methylnonane C ₂ H ₅ (CH ₂) ₅ CHC ₂ H ₅ ...	142.17		166.9	0.735	197
4000	C ₁₀ H ₂₂	5-Methylnonane (C ₂ H ₅) ₂ CHCH ₂	142.17		166.2	0.732	189
4001	C ₁₀ H ₂₂	Tripropylmethane (C ₃ H ₇) ₃ CH.....	142.17		161.7	0.740 ^{15,2}	210
4002	C ₁₀ H ₂₂ O	<i>n</i> -Decyl alcohol CH ₃ (CH ₂) ₉ OH.....	158.17	7	231	0.829	
4003	C ₁₀ H ₂₂ O	3, 7-Dimethyl- <i>n</i> -octyl alcohol.....	158.17		118 ¹⁵	0.849 ²	
4004	C ₁₀ H ₂₂ O	Methylethylisohexyl carbinol.....	158.17		89 ¹⁴	0.834 ¹⁵	851
4005	C ₁₀ H ₂₂ O	Propyl- <i>n</i> -hexyl carbinol.....	158.17		211	0.826	
4006	C ₁₀ H ₂₂ O	<i>n</i> -Amyl ether (C ₅ H ₁₁) ₂ O.....	158.17		190	0.774	
4007	C ₁₀ H ₂₂ O	Isoamyl ether [(CH ₃) ₂ CHCH ₂ CH ₂] ₂ O...	158.17		172.2	0.783 ^{11,8}	172
4008	C ₁₀ H ₂₂ O ₃	<i>cis</i> -Terpine hydrate.....	190.15	117.1			1210
4009	C ₁₀ H ₂₂ O ₆ S ₂	<i>d</i> -Glucosediethylmercaptal.....	286.30	128			
4010	C ₁₀ H ₂₂ S	Diisoamyl sulfide.....	174.23		216	0.843	443
4011	C ₁₀ H ₂₂ N	<i>n</i> -Decylamine CH ₃ (CH ₂) ₉ NH ₂ ...	157.19	17	218		
4012	C ₁₀ H ₂₂ N	Diisoamylamine.....	157.19		190	0.767	281
4013	C ₁₀ H ₂₁ Sb	Pentaethyl stibine (C ₂ H ₅) ₅ Sb.....	266.96		100		
4014	C ₁₀ H ₂₀ O	α (β)-Lactuceryl.....	166.23	181			
4015	C ₁₀ H ₁₆ O ₆	Agaric acid.....	230.23	142 d.			
4016	C ₁₁ H ₈ O ₁₀	Benzenepentacarboxylic acid.....	298.05	233 d.			
4017	C ₁₁ H ₇ ClO	α -Naphthoyl chloride C ₁₀ H ₇ COCl.....	190.51		297.5		
4018	C ₁₁ H ₇ ClO	β -Naphthoyl chloride C ₁₀ H ₇ COCl.....	190.51	43	306		
4019	C ₁₁ H ₇ N	α -Naphthylcyanide.....	153.06	33.5	296.5	1.117 ⁵	
4020	C ₁₁ H ₇ N	β -Naphthylcyanide.....	153.06	66.5	305	1.094 ^{4,6}	
4021	C ₁₁ H ₇ NO ₄	Quinoline-2, 3-dicarboxylic acid.....	217.06	130 d.			
4022	C ₁₁ H ₇ NO ₄	Quinoline-2, 4-dicarboxylic acid.....	217.06	246			
4023	C ₁₁ H ₈ O	α -Naphthaldehyde.....	156.06		291.6	1.148	962
4024	C ₁₁ H ₈ O	β -Naphthaldehyde.....	156.06	60.5		1.078 ^{99,4}	1133
4025	C ₁₁ H ₈ N ₂ O ₄	Benzoylbarbituric acid.....	232.08	275			
4026	C ₁₁ H ₈ O ₂	2-Hydroxy- α -naphthaldehyde.....	172.06	81	192 ⁹⁷		
4027	C ₁₁ H ₈ O ₂	4-Hydroxy- α -naphthaldehyde.....	172.06	178			
4028	C ₁₁ H ₈ O ₂	8-Hydroxy- α -naphthoic acid.....	188.06	169			
4029	C ₁₁ H ₈ O ₂	α -Naphthoic acid.....	172.06	160	300		
4030	C ₁₁ H ₈ O ₂	β -Naphthoic acid.....	172.06	185	>300	1.077 ¹⁰⁰	
4031	C ₁₁ H ₈ O ₂	3-Hydroxy- β -naphthoic acid.....	188.06	219			
4032	C ₁₁ H ₈ N	2-Phenylpyridine.....	155.08		270	>1	
4033	C ₁₁ H ₈ N	3-Phenylpyridine.....	155.08		270.4	>1	
4034	C ₁₁ H ₈ N	4-Phenylpyridine.....	155.08	78	275		
4035	C ₁₁ H ₈ NO ₂	Aniluvitonic acid.....	187.08	241			
4036	C ₁₁ H ₈ NO ₂	Quininic acid.....	203.08	280			
4037	C ₁₁ H ₈ NO ₆	Hydrastininic acid.....	251.08	164			
4038	C ₁₁ H ₁₀	α -Methylnaphthalene.....	142.08	-22	243	1.025	790
4039	C ₁₁ H ₁₀	β -Methylnaphthalene.....	142.08	35.1	245	1.029	1062
4040	C ₁₁ H ₁₀ I ₂ NO ₃	Thyroxine.....	584.88	250			
4041	C ₁₁ H ₁₀ O	Methyl α -naphthyl ether.....	158.08	<-10	258	1.096 ^{1,2,9}	831
4042	C ₁₁ H ₁₀ O	Methyl β -naphthyl ether.....	158.08	72	274		
4043	C ₁₁ H ₁₀ O ₂	Ethyl phenylpropionate.....	174.08		270 d.		
4043.1	C ₁₁ H ₁₁ BrN ₂ O	4-Bromoantipyrine.....	267.02	117			1181
4044	C ₁₁ H ₁₁ N	2, 4-Dimethylquinoline.....	157.09		264		
4045	C ₁₁ H ₁₁ N	2, 6-Dimethylquinoline.....	157.09	58	261		
4046	C ₁₁ H ₁₁ N	2, 7-Dimethylquinoline.....	157.09	61	265		
4047	C ₁₁ H ₁₁ N	3, 4-Dimethylquinoline.....	157.09	65	291		
4048	C ₁₁ H ₁₁ N	4, 6-Dimethylquinoline.....	157.09		256		
4049	C ₁₁ H ₁₁ N	4, 7-Dimethylquinoline.....	157.09	55	259		
4050	C ₁₁ H ₁₁ N	Methyl- α -naphthylamine.....	157.09		293		
4051	C ₁₁ H ₁₁ NO	Physostigmol.....	173.09	108			
4052	C ₁₁ H ₁₁ NO ₃	Indole-2-propionic acid.....	189.09	136			
4053	C ₁₁ H ₁₁ NO ₄	Ethyl <i>o</i> -nitrocinnamate.....	221.09	44			
4054	C ₁₁ H ₁₁ NO ₄	Ethyl <i>p</i> -nitrocinnamate.....	221.09	141			
4055	C ₁₁ H ₁₂ BrNO ₂ S	<i>p</i> -Bromophenylmercapturic acid.....	318.08	153			
4056	C ₁₁ H ₁₂ IN	Quinaldine methiodide.....	285.03	190			
4057	C ₁₁ H ₁₂ IN	Quinoline ethiodide.....	285.03	157	d.		
4058	C ₁₁ H ₁₂ N ₂ O	Antipyrine.....	188.11	109; 113	319 ¹⁷⁴		1307

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4059	C ₁₁ H ₁₂ N ₂ O ₂	4, 4-Phenylethylhydantoin.....	204.11	199			
4060	C ₁₁ H ₁₂ N ₂ O ₂	<i>l</i> -Tryptophane.....	204.11	289			
4060.1	C ₁₁ H ₁₂ O	Benzylidene methyl ethyl ketone.....	160.09	37.5		0.987 ⁵⁰	1061
4061	C ₁₁ H ₁₂ O ₂	Ethyl atropate.....	176.09		124.4 ¹⁶	1.051	
4062	C ₁₁ H ₁₂ O ₂	<i>trans</i> -Ethyl cinnamate.....	176.09	6.5	271	1.049	746
4063	C ₁₁ H ₁₂ O ₂	3-Benzoylbutyric acid.....	192.09	126			
4064	C ₁₁ H ₁₂ O ₂	Ethyl benzoylacetate.....	192.09		270 d.	1.122	704
4065	C ₁₁ H ₁₂ O ₂	α -Ethyl phenylpyruvate.....	192.09	52	154.5 ¹⁶		
4066	C ₁₁ H ₁₂ O ₂	β -Ethyl phenylpyruvate.....	192.09		152 ¹⁶		
4067	C ₁₁ H ₁₂ O ₂	γ -Ethyl phenylpyruvate.....	192.09	79			
4068	C ₁₁ H ₁₂ O ₂	Eugenol formate.....	192.09		150 ²⁰		
4069	C ₁₁ H ₁₂ O ₂	Isoeugenol formate.....	192.09		160 ²⁰		
4071	C ₁₁ H ₁₂ O ₄	Benzylsuccinic acid.....	208.09	161			
4072	C ₁₁ H ₁₂ O ₄	α -Hydropiperic acid.....	208.09	76			
4073	C ₁₁ H ₁₂ O ₄	Sinapic acid.....	224.09	191			
4074	C ₁₁ H ₁₂ BrN ₂ O	Antipyrine hydrobromide.....	269.03	150			
4075	C ₁₁ H ₁₂ ClN ₂ O	Antipyrine hydrochloride.....	224.57	160			
4076	C ₁₁ H ₁₂ N	Lilolidine.....	159.11		156 ¹⁵		
4077	C ₁₁ H ₁₂ NO ₂	Hydrastinine.....	207.11	116			
4077.1	C ₁₁ H ₁₂ NO ₂	Ethyl hippurate.....	207.11	60.5	180	1.043 ²²	
4078	C ₁₁ H ₁₂ NO ₄	Benzacetin.....	223.11	190			
4079	C ₁₁ H ₁₂ NO ₄	Neurodin.....	223.11	87			
4080	C ₁₁ H ₁₂ N ₂ O	4-Aminoisoantipyrine.....	203.12	109			
4081	C ₁₁ H ₁₂ N ₂ O	Benzylcreatinine.....	203.12	225			
4082	C ₁₁ H ₁₂ N ₂ O ₆	2, 4, 6-Trinitro- <i>tert</i> -butyltoluene.....	283.12	97			
4083	C ₁₁ H ₁₂ ClNO ₂	Hydrastinine hydrochloride.....	243.57	210			
4084	C ₁₁ H ₁₄ N ₂	Calycanthine.....	174.12	243			
4085	C ₁₁ H ₁₄ N ₂	Isocalycanthine.....	174.12	235			
4086	C ₁₁ H ₁₄ N ₂ O	Cytisine.....	190.12	153			1333
4087	C ₁₁ H ₁₄ N ₂ O ₂	Antithermine (Acetopropionylphenylhydrazone).....	206.12	108			
4088	C ₁₁ H ₁₄ O	Butyl phenyl ketone C ₆ H ₅ COC ₄ H ₉	162.11		239.5		
4089	C ₁₁ H ₁₄ O	Isobutyl phenyl ketone.....	162.11		225	0.967	
4090	C ₁₁ H ₁₄ O	Isopropyl benzyl ketone.....	162.11		237	0.985 ⁹	
4090.1	C ₁₁ H ₁₄ O	<i>p</i> -Methylbutyrophenone.....	162.11		252 ⁷³⁰	1.026	683
4091	C ₁₁ H ₁₄ O	Propyl benzyl ketone.....	162.11		244	0.984 ⁹	
4091.1	C ₁₁ H ₁₄ O	2, 4, 6-Trimethylacetophenone.....	162.11		240.5 ⁷³⁶	0.975	661
4092	C ₁₁ H ₁₄ O ₂	Eugenol methyl ether.....	178.11		249	1.055 ¹⁵	
4093	C ₁₁ H ₁₄ O ₂	Isoeugenol methyl ether.....	178.11		264	1.055	
4094	C ₁₁ H ₁₄ O ₂	<i>p</i> -Isopropylphenylacetic acid.....	178.11	52			
4095	C ₁₁ H ₁₄ O ₂	<i>n</i> -Butyl benzoate C ₆ H ₅ CO ₂ C ₄ H ₉	178.11	-22.4	250.3	1.000 ²⁰	
4096	C ₁₁ H ₁₄ O ₂	Benzyl butyrate C ₆ H ₅ CO ₂ CH ₂ C ₄ H ₉	178.11		240	1.016 ^{17.5}	
4097	C ₁₁ H ₁₄ O ₂	Benzyl isobutyrate.....	178.11		228	1.016 ¹⁸	557
4097.1	C ₁₁ H ₁₄ O ₂	<i>d</i> - β -Butyl benzoate.....	178.11		120 ²⁰	1.000	563
4098	C ₁₁ H ₁₄ O ₂	Ethyl hydrocinnamate.....	178.11		249	1.015	571
4099	C ₁₁ H ₁₄ O ₂	Isobutyl benzoate.....	178.11		237	1.002 ¹⁶	
4100	C ₁₁ H ₁₄ O ₂	Phenyl isovalerate.....	178.11		226		
4101	C ₁₁ H ₁₄ O ₂	<i>n</i> -Butyl salicylate.....	194.11		155 ¹⁶		
4102	C ₁₁ H ₁₄ O ₂	Propyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ C ₃ H ₇	194.11		176 ⁴⁶	1.09	653
4103	C ₁₁ H ₁₄ O ₂	Zingerone.....	194.11	41	188 ¹⁴		
4104	C ₁₁ H ₁₄ NO	<i>p</i> -Diethylaminobenzaldehyde.....	177.12	41	174 ⁷		
4105	C ₁₁ H ₁₄ NO	Isovaleroanilide.....	177.12	115			
4106	C ₁₁ H ₁₄ NO	<i>n</i> -Valeroanilide.....	177.12	49	267		
4107	C ₁₁ H ₁₄ NO ₂	<i>p</i> -Diethylaminobenzoic acid.....	193.12	193			
4108	C ₁₁ H ₁₄ NO ₂	Isobutyl <i>p</i> -aminobenzoate.....	193.12	65			
4109	C ₁₁ H ₁₄ NO ₂	Methylacetophenetidine.....	193.12	40	300		
4110	C ₁₁ H ₁₄ NO ₂	Triphenin.....	193.12	120			
4111	C ₁₁ H ₁₄ NO ₂	Anhalamine.....	209.12	188			
4112	C ₁₁ H ₁₄ NO ₂	Lactophenine.....	209.12	118			
4113	C ₁₁ H ₁₄ NO ₂	Methoxyacetophenetidin.....	209.12	98			
4114	C ₁₁ H ₁₄ NO ₂ S	Hydrastinine bisulfate.....	305.19	216			
4115	C ₁₁ H ₁₆	<i>n</i> -Amylbenzene CH ₃ (CH ₂) ₄ C ₆ H ₅	148.12		202.1	0.860	514
4116	C ₁₁ H ₁₆	<i>tert</i> -Amylbenzene.....	148.12		189.3	0.874 ¹⁶	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4117	C ₁₁ H ₁₆	3, 5-Diethyltoluene.....	148.12		200	0.879	
4118	C ₁₁ H ₁₆	Isoamylbenzene (CH ₃) ₂ CH(CH ₂) ₂ C ₆ H ₅ ..	148.12		194	0.885	
4119	C ₁₁ H ₁₆	Pentamethylbenzene (CH ₃) ₅ C ₆ H.....	148.12	53	230	0.847 ^{107.3}	1152
4120	C ₁₁ H ₁₆	4-Propyl- <i>o</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148.12	< -20	209		
4121	C ₁₁ H ₁₆	4-Propyl- <i>m</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148.12	< -20	208.5		
4122	C ₁₁ H ₁₆	2-Propyl- <i>p</i> -xylene C ₆ H ₄ C ₃ H ₇ (CH ₃) ₂	148.12	< -20	207		
4123	C ₁₁ H ₁₆ Br ₂ N ₂ O ₂	<i>N</i> -2, 3-Dibromopropyl-5, 5-diethylbarbituric acid.....	383.97	125			
4124	C ₁₁ H ₁₆ ClNO ₂	Anhalamine hydrochloride.....	245.59	258			
4125	C ₁₁ H ₁₆ N ₂ O ₂	Pilocarpine.....	208.14	34			
4126	C ₁₁ H ₁₆ N ₂ O ₂	Isopilocarpine.....	208.14		261 ¹⁰		
4127	C ₁₁ H ₁₆ O	<i>p</i> -Isoamylphenol.....	164.12	93	255		
4128	C ₁₁ H ₁₆ O	Pentamethylphenol.....	164.12	125	267		
4129	C ₁₁ H ₁₆ O	Benzyl <i>n</i> -butyl ether C ₆ H ₅ CH ₂ OC ₄ H ₉	164.12		216		
4130	C ₁₁ H ₁₆ O	Benzyl isobutyl ether.....	164.12		213	0.928 ^{10.3}	
4131	C ₁₁ H ₁₆ O	Phenyl isoamyl ether.....	164.12		225	0.920	545
4132	C ₁₁ H ₁₆ O	Thymyl methyl ether.....	164.12		216.2	0.954	
4133	C ₁₁ H ₁₇ BrN ₂ O ₂	Isopilocarpine hydrobromide.....	289.06	147			
4134	C ₁₁ H ₁₇ BrN ₂ O ₂	Pilocarpine hydrobromide.....	289.06	185			1333
4135	C ₁₁ H ₁₇ ClN ₂ O ₂	Isopilocarpine hydrochloride.....	244.61	127			
4136	C ₁₁ H ₁₇ ClN ₂ O ₂	Pilocarpine hydrochloride.....	244.61	196.7			1333
4137	C ₁₁ H ₁₇ N	<i>o</i> -Diethyltoluidine.....	163.14		206		
4138	C ₁₁ H ₁₇ N	<i>m</i> -Diethyltoluidine.....	163.14		228		
4139	C ₁₁ H ₁₇ N	<i>p</i> -Diethyltoluidine.....	163.14		229	0.924 ^{16.6}	
4140	C ₁₁ H ₁₇ N	Isoamylaniline.....	163.14		254.5	0.928 ¹⁶	
4141	C ₁₁ H ₁₇ NO ₂	Mescaline.....	211.14	151			
4142	C ₁₁ H ₁₇ N ₂ O ₆	Isopilocarpine nitrate.....	271.16	159			
4143	C ₁₁ H ₁₇ N ₂ O ₆	Pilocarpine nitrate.....	271.16	173			1333
4144	C ₁₁ H ₁₇ O ₂	Citronellyl formate.....	181.13		98 ¹¹	0.884	453
4145	C ₁₁ H ₁₈ N ₂ O ₂	5, 5- <i>n</i> -Butylisopropylbarbituric acid.....	226.16	210			
4146	C ₁₁ H ₁₈ N ₂ O ₂	5, 5-Isoamylethylbarbituric acid.....	226.16	156			
4147	C ₁₁ H ₁₈ O ₂	<i>d</i> -Bornyl formate.....	182.14		230	1.009	858
4148	C ₁₁ H ₁₈ O ₂	Geranyl formate.....	182.14		98 ¹¹	0.909	491
4149	C ₁₁ H ₁₈ O ₂	Isobornyl formate.....	182.14		100 ¹⁴	1.017 ¹⁶	
4150	C ₁₁ H ₁₈ O ₂	Methyl geranate.....	182.14		117 ¹⁴	0.922	961
4151	C ₁₁ H ₁₈ O ₂	<i>d</i> , α -Terpinyl formate.....	182.14		136 ¹⁰	0.999 ⁰	
4152	C ₁₁ H ₁₈ O ₄	Ethyl camphorate.....	214.14	87			
4153	C ₁₁ H ₁₈ O ₄	Diethyl ethylacetylmalonate.....	230.14		137.5 ²⁰	1.053	316
4154	C ₁₁ H ₁₉ N ₃ O	<i>d</i> -Camphor semicarbazone.....	209.17	238			
4155	C ₁₁ H ₂₀ O	Geranyl methyl ether.....	168.15		212		
4156	C ₁₁ H ₂₀ O	Methyl <i>d</i> -bornyl ether.....	168.15		195.3	0.916	1011
4157	C ₁₁ H ₂₀ O ₂	<i>l</i> -Menthyl formate.....	184.15	9	217	0.936	
4158	C ₁₁ H ₂₀ O ₂	Undecylenic acid.....	184.15	24.5	295	0.907	
4159	C ₁₁ H ₂₀ O ₃	Isoamyl ethylacetoacetate.....	200.15		236 d.	0.951 ²⁵	
4160	C ₁₁ H ₂₀ O ₄	Di- <i>n</i> -butyl malonate CH ₃ (CO ₂ C ₄ H ₉) ₂ ..	216.15		251.5	1.005 ⁰	
4161	C ₁₁ H ₂₀ O ₄	Diethyl diethylmalonate.....	216.15		223	0.990	282
4162	C ₁₁ H ₂₀ O ₄	Isoamyl isopropyl malonate.....	216.15		140 ²⁸	0.958 ²⁶	314
4163	C ₁₁ H ₂₀ O ₆	Glycerol 1, 2-dibutyrate.....	232.15		282		
4164	C ₁₁ H ₂₁ NO ₂	Menthyl carbamate.....	199.17	165	>200 d.		
4165	C ₁₁ H ₂₂	α -Undecylene CH ₂ :CH(CH ₂) ₈ CH ₃	154.17		188	0.763	
4166	C ₁₁ H ₂₂	β -Undecylene CH ₃ CH:CH(CH ₂) ₇ CH ₃ ..	154.17		193	0.774 ¹⁶	341
4167	C ₁₁ H ₂₂ N ₂ O ₄	Clavine.....	260.19	263			
4168	C ₁₁ H ₂₂ O	Methyl <i>l</i> -menthyl ether.....	170.17			0.861	
4169	C ₁₁ H ₂₂ O	Undecylic aldehyde.....	170.17	-4	117 ¹⁸	0.825 ²³	342
4170	C ₁₁ H ₂₂ O	Diamyl ketone (C ₆ H ₁₁) ₂ CO.....	170.17	14.6	226.3	0.826 ²⁰	
4171	C ₁₁ H ₂₂ O	Diisoamyl ketone.....	170.17		226		
4172	C ₁₁ H ₂₂ O	Methyl <i>n</i> -nonyl ketone.....	170.17	12.1	228	0.826	312
4173	C ₁₁ H ₂₂ O ₂	Umbellulic acid.....	186.17	23	280		
4174	C ₁₁ H ₂₂ O ₂	Undecylic acid CH ₃ (CH ₂) ₁₁ CO ₂ H.....	186.17	29.3	228 ¹⁰⁰		1066
4175	C ₁₁ H ₂₂ O ₂	Ethyl pelargonate C ₆ H ₁₇ CO ₂ C ₂ H ₅	186.17	-44.5	219	0.866 ^{17.5}	
4176	C ₁₁ H ₂₂ O ₂	Methyl caprate C ₆ H ₁₉ CO ₂ CH ₃	186.17	-18	224		
4177	C ₁₁ H ₂₂ O ₃	Diisoamyl carbonate.....	202.17		228.7	0.912 ¹⁶	
4178	C ₁₁ H ₂₄	<i>n</i> -Undecane CH ₃ (CH ₂) ₉ CH ₃	156.18	-26.5	197	0.741	234

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4178.1	C ₁₁ H ₂₄	←Ethylnonane.....	156.18		71 ¹⁸	0.751 ¹⁹	
4179	C ₁₁ H ₂₄ O	<i>n</i> -Undecyl alcohol CH ₃ (CH ₂) ₉ CH ₂ OH..	172.19	19	146 ²⁰	0.833	374
4179.1	C ₁₁ H ₂₄ O	<i>n</i> -Undecan-6-ol.....	172.19	16	235 ²⁴	0.833	
4180	C ₁₁ H ₂₅ N	<i>n</i> -Undecylamine CH ₃ (CH ₂) ₉ CH ₂ NH ₂ ...	171.20	16.5	234		
4181	C ₁₂ H ₈ N ₂ O ₁₂	Dipicrylamine [2, 4, 6-(NO ₂) ₃ C ₆ H ₂] ₂ NH	439.10	250 d.			
4182	C ₁₂ H ₆ O ₁₂	Mellitic acid C ₆ (CO ₂ H) ₆	342.05	286			
4183	C ₁₂ H ₇ N ₂ O ₇	Phenyl picrate.....	305.08	153			
4184	C ₁₂ H ₈	Acenaphthylene.....	152.06	93	275		1192
4185	C ₁₂ H ₈ AsN	Phenarsazine.....	241.03	310			
4185.1	C ₁₂ H ₈ Br ₂	<i>p</i> , <i>p'</i> -Di-(bromophenyl).....	311.89	164		1.897	
4186	C ₁₂ H ₈ Cl ₂	1, 2-Dichloracenaphthene.....	222.98	115			
4187	C ₁₂ H ₈ N ₂	Phenanthroline.....	180.08	78.5	>360		
4188	C ₁₂ H ₈ N ₂	Phenazine.....	180.08	171	>360		
4189	C ₁₂ H ₈ N ₂	Phenazone.....	180.08	156	>360		
4190	C ₁₂ H ₈ N ₂	Pseudophenanthroline.....	180.08	173			
4191	C ₁₂ H ₈ N ₂ O ₄	Dinitroacenaphthene.....	244.08	206 d.			
4192	C ₁₂ H ₈ N ₂ O ₄	<i>o</i> , <i>o'</i> -Dinitrodiphenyl.....	244.08	124			
4193	C ₁₂ H ₈ N ₂ O ₄	<i>m</i> , <i>m'</i> -Dinitrodiphenyl.....	244.08	198			
4194	C ₁₂ H ₈ N ₂ O ₄	<i>p</i> , <i>p'</i> -Dinitrodiphenyl.....	244.08	233			
4195	C ₁₂ H ₈ O	Diphenylene oxide.....	168.06	87	288		
4196	C ₁₂ H ₈ O ₂	2-Phenylbenzoquinone.....	184.06	107			
4197	C ₁₂ H ₈ O ₄	1, 8-Naphthalic acid.....	216.06	270			
4198	C ₁₂ H ₈ O ₄	Bergaptene.....	216.06	188			
4199	C ₁₂ H ₈ O ₄	Paracotoin.....	216.06	152			
4200	C ₁₂ H ₈ O ₄	Xanthotoxin.....	216.06	146			
4201	C ₁₂ H ₈ S ₂	Thianthrene.....	216.19	160	366		
4202	C ₁₂ H ₈ AsClN	Phenarsazine chloride.....	277.50	193			
4203	C ₁₂ H ₈ Br	3-Bromoacenaphthene.....	232.99	51.2	336.4	1.437 ⁴⁵	
4204	C ₁₂ H ₈ Cl	3-Chloroacenaphthene.....	188.53	69.8	319		
4205	C ₁₂ H ₈ Cl	<i>o</i> -Chlorodiphenyl <i>o</i> -ClC ₆ H ₄ C ₆ H ₅	188.53	34	268		
4206	C ₁₂ H ₈ Cl	<i>m</i> -Chlorodiphenyl <i>m</i> -ClC ₆ H ₄ C ₆ H ₅	188.53	89			
4207	C ₁₂ H ₈ Cl	<i>p</i> -Chlorodiphenyl <i>p</i> -ClC ₆ H ₄ C ₆ H ₅	188.52	75.5	282		
4208	C ₁₂ H ₈ ClN ₂	<i>m</i> -Chloroazobenzene.....	216.54	67.5			
4209	C ₁₂ H ₈ ClN ₂	<i>p</i> -Chloroazobenzene <i>p</i> -ClC ₆ H ₄ NNC ₆ H ₅	216.54	89			
4210	C ₁₂ H ₈ I	3-Iodoacenaphthene.....	280.00	65	180 d.	1.674 ⁴²	
4211	C ₁₂ H ₈ N	Carbazole.....	167.08	244.8	354.8		1333
4212	C ₁₂ H ₈ NO ₂	<i>o</i> -Nitrodiphenyl <i>o</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199.08	37	320		
4213	C ₁₂ H ₈ NO ₂	<i>m</i> -Nitrodiphenyl <i>m</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199.08	61			
4214	C ₁₂ H ₈ NO ₂	<i>p</i> -Nitrodiphenyl <i>p</i> -NO ₂ C ₆ H ₄ C ₆ H ₅	199.08	113	340		
4215	C ₁₂ H ₈ NS	Thiodiphenylamine.....	199.14	180	371 d.		
4216	C ₁₂ H ₈ N ₂ O ₂	<i>p</i> -Nitroazobenzene.....	227.09	129.9			
4217	C ₁₂ H ₈ N ₂ O ₄	2, 4-Dinitro-4'-hydroxydiphenylamine.....	275.09	190			
4218	C ₁₂ H ₁₀	Acenaphthene.....	154.08	95	277.5	1.024 ^{99,2}	1127, 1193 1105
4219	C ₁₂ H ₁₀	Diphenyl C ₆ H ₅ C ₆ H ₅	154.08	69.0	254.9	1.041	
4220	C ₁₂ H ₁₀ AsCl	Diphenyl arsine chloride.....	264.50	42.8	327 d.	1.583 ⁴⁰	
4221	C ₁₂ H ₁₀ As ₂	Arsenobenzene C ₆ H ₅ AsAsC ₆ H ₅	304.00	196			
4221.1	C ₁₂ H ₁₀ ClI	Diphenyliodonium chloride.....	316.47	d. 230		1.67	
4222	C ₁₂ H ₁₀ Cl ₂ N ₂	Dichlorobenzidine [2, 4-Cl(NH ₂)C ₆ H ₃] ₂	253.01	163			
4223	C ₁₂ H ₁₀ Cl ₂ N ₂	<i>p</i> , <i>p</i> -Dichlorobenzidine.....	253.01	60			
4224	C ₁₂ H ₁₀ N ₂	Aribine.....	182.09	237			
4225	C ₁₂ H ₁₀ N ₂	Azobenzene C ₆ H ₅ NNC ₆ H ₅	182.09	67	297.4	1.203	
4226	C ₁₂ H ₁₀ N ₂ O	Azoxybenzene.....	198.09	36		1.246	1031
4227	C ₁₂ H ₁₀ N ₂ O	<i>p</i> -Hydroxyazobenzene.....	198.09	152			
4228	C ₁₂ H ₁₀ N ₂ O	<i>N</i> -Nitrosodiphenylamine (C ₆ H ₅) ₂ NNO..	198.09	66.5			
4229	C ₁₂ H ₁₀ N ₂ O	<i>p</i> -Nitrosophenylaniline.....	198.09	143			
4230	C ₁₂ H ₁₀ N ₂ O ₂	<i>o</i> , <i>o'</i> -Azophenol.....	214.09	172			
4231	C ₁₂ H ₁₀ N ₂ O ₂	<i>m</i> , <i>m'</i> -Azophenol HOC ₆ H ₄ NNC ₆ H ₄ OH..	214.09	205			
4232	C ₁₂ H ₁₀ N ₂ O ₂	<i>p</i> , <i>p'</i> -Azophenol.....	214.09	215			
4233	C ₁₂ H ₁₀ N ₂ O ₂	<i>o</i> -Nitrodiphenylamine.....	214.09	75			
4234	C ₁₂ H ₁₀ N ₂ O ₂	<i>p</i> -Nitrodiphenylamine.....	214.09	133			
4235	C ₁₂ H ₁₀ N ₂ O ₂ S	Benzidinesulfone.....	246.16	>350			
4236	C ₁₂ H ₁₀ N ₂ O ₂	<i>o</i> , <i>o'</i> -Azoxyphenol.....	288.17	102			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4237	C ₁₂ H ₁₀ N ₂ O ₂	<i>p, p'</i> -Azoxyphenol.....	288.17	156; 107			
4238	C ₁₂ H ₁₀ O	<i>o</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH.....	170.08	56	275		
4239	C ₁₂ H ₁₀ O	<i>m</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH.....	170.08	78	>300		
4240	C ₁₂ H ₁₀ O	<i>p</i> -Phenylphenol C ₆ H ₅ C ₆ H ₄ OH.....	170.08	165	308		
4241	C ₁₂ H ₁₀ O	Phenyl ether C ₆ H ₅ OC ₆ H ₅	170.08	26.9	259	1.072	1019
4242	C ₁₂ H ₁₀ OS	Diphenyl sulfoxide (C ₆ H ₅) ₂ SO.....	202.14	70.5	340		
4243	C ₁₂ H ₁₀ O ₂	<i>o, o'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH.....	186.08	109	326		
4244	C ₁₂ H ₁₀ O ₂	<i>o, p'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH.....	186.08	161	342		
4245	C ₁₂ H ₁₀ O ₂	<i>m, m'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH.....	186.08	123.5			
4246	C ₁₂ H ₁₀ O ₂	<i>p, p'</i> -Diphenol OHC ₆ H ₄ C ₆ H ₄ OH.....	186.08	272			
4247	C ₁₂ H ₁₀ O ₂	α -Naphthyl acetate CH ₃ CO ₂ C ₁₀ H ₇	186.08	44.8			
4248	C ₁₂ H ₁₀ O ₂	β -Naphthyl acetate CH ₃ CO ₂ C ₁₀ H ₇	186.08	68.5			
4249	C ₁₂ H ₁₀ O ₂ S	Diphenyl sulfone (C ₆ H ₅) ₂ SO ₂	218.14	129	377.8		
4250	C ₁₂ H ₁₀ O ₂ S	Phenyl benzenesulfonate.....	234.14	35			
4251	C ₁₂ H ₁₀ O ₄	2, 2'-Diresorcinol.....	218.08	268			
4252	C ₁₂ H ₁₀ O ₄	4, 4'-Diresorcinol.....	218.08	222			
4253	C ₁₂ H ₁₀ O ₄	5, 5'-Diresorcinol.....	218.08	310			
4254	C ₁₂ H ₁₀ O ₄	Piperic acid.....	218.08	217	220 d.		
4255	C ₁₂ H ₁₀ O ₄	Quinhydrone.....	218.08	171			
4256	C ₁₂ H ₁₀ O ₄ S	4, 4'-Dihydroxydiphenylsulfone.....	250.14	239			
4257	C ₁₂ H ₁₀ O ₆	Paracotic acid.....	234.08	108			
4258	C ₁₂ H ₁₀ O ₆ S ₂	Benzenesulfonic anhydride.....	298.21	90	240 ¹⁰ d.		
4259	C ₁₂ H ₁₀ P ₂	Phosphobenzene C ₆ H ₅ P.PC ₆ H ₅	216.13	149			
4260	C ₁₂ H ₁₀ S	Diphenyl sulfide (C ₆ H ₅) ₂ S.....	186.14		293	1.119 ¹⁵	948
4261	C ₁₂ H ₁₀ S ₂	Diphenyl disulfide (C ₆ H ₅) ₂ S ₂	218.21	61	310		
4262	C ₁₂ H ₁₀ Se	Diphenyl selenide (C ₆ H ₅) ₂ Se.....	233.28		302	1.356 ¹⁶	
4263	C ₁₂ H ₁₀ Te	Diphenyl telluride (C ₆ H ₅) ₂ Te.....	281.58		320	1.556 ¹⁶	800
4264	C ₁₂ H ₁₁ As	Diphenylarsine (C ₆ H ₅) ₂ AsH.....	230.05		155 ¹⁷		
4265	C ₁₂ H ₁₁ AsO ₂	Diphenylarsonic acid (C ₆ H ₅) ₂ AsOOH.....	262.05	178			
4266	C ₁₂ H ₁₁ N	<i>o</i> -Aminodiphenyl C ₆ H ₅ C ₆ H ₄ NH ₂	169.09	45.5	299		
4267	C ₁₂ H ₁₁ N	2-Benzylpyridine.....	169.09		276		
4268	C ₁₂ H ₁₁ N	3-Benzylpyridine.....	169.09	34	286		
4269	C ₁₂ H ₁₁ N	4-Benzylpyridine.....	169.09		287		
4270	C ₁₂ H ₁₁ N	Diphenylamine (C ₆ H ₅) ₂ NH.....	169.09	53	302	1.159	1333
4271	C ₁₂ H ₁₁ NO	<i>m</i> -Phenylaminophenol.....	185.09	82	340		
4272	C ₁₂ H ₁₁ NO ₂ S	Benzenesulfanilide.....	233.16	110			1183
4273	C ₁₂ H ₁₁ N ₂	<i>m</i> -Aminoazobenzene.....	197.11	59			
4274	C ₁₂ H ₁₁ N ₂	<i>p</i> -Aminoazobenzene C ₆ H ₅ N ₂ C ₆ H ₄ NH ₂	197.11	126	>360		
4275	C ₁₂ H ₁₁ N ₂	Diazoaminobenzene C ₆ H ₅ N ₂ NHC ₆ H ₅	197.11	96	exp.		
4276	C ₁₂ H ₁₁ N ₂ O ₂	<i>o</i> -Nitrobenzidine.....	229.11	143			
4277	C ₁₂ H ₁₁ N ₂ O ₂	<i>m</i> -Nitrobenzidine.....	229.11	190			
4278	C ₁₂ H ₁₁ P	Diphenylphosphine (C ₆ H ₅) ₂ PH.....	186.11		280	1.07 ¹⁶	
4279	C ₁₂ H ₁₂	1, 4-Dimethylnaphthalene.....	156.09	< -18	264.3	1.016	900
4280	C ₁₂ H ₁₂	2, 3-Dimethylnaphthalene.....	156.09		266		
4281	C ₁₂ H ₁₂	2, 6-Dimethylnaphthalene.....	156.09	111			
4282	C ₁₂ H ₁₂	α -Ethylnaphthalene.....	156.09	< -14	258 d.	1.064 ¹⁵	
4283	C ₁₂ H ₁₂	β -Ethylnaphthalene.....	156.09	-19	251	1.008 ⁰	
4284	C ₁₂ H ₁₂ ClN	Diphenylamine hydrochloride.....	205.56				1333
4285	C ₁₂ H ₁₂ N ₂	<i>p</i> -Aminodiphenylamine.....	184.11	75	354		
4286	C ₁₂ H ₁₂ N ₂	Benzidine (<i>p</i> -NH ₂ C ₆ H ₄) ₂	184.11	128.7	401.7		
4287	C ₁₂ H ₁₂ N ₂	β -Benzidine.....	184.11	45	363		
4288	C ₁₂ H ₁₂ N ₂	1, 1-Diphenylhydrazine (C ₆ H ₅) ₂ NNH ₂	184.11	36	220 ¹⁰		
4289	C ₁₂ H ₁₂ N ₂	Hydrazobenzene C ₆ H ₅ NHNHC ₆ H ₅	184.11	131	d.		
4290	C ₁₂ H ₁₂ N ₂ O	Harmalol.....	200.11	212 d.			
4291	C ₁₂ H ₁₂ N ₂ O ₂	Luminal (5,5-Phenylethylbarbituric acid)	232.11	173			
4292	C ₁₂ H ₁₂ N ₂ O ₆ S ₂	Benzene- <i>o, o'</i> -disulfonic acid.....	344.24	> 175 d.			
4293	C ₁₂ H ₁₂ N ₄	Chrysoidine.....	212.12	117.5			1333
4294	C ₁₂ H ₁₂ N ₄	<i>p, p'</i> -Diaminoazobenzene.....	212.12	241			
4295	C ₁₂ H ₁₂ N ₄ O ₄	Urocanic acid.....	276.12	213 d.			
4296	C ₁₂ H ₁₂ O	Ethyl α -naphthyl ether.....	172.09	5.5	276.4	1.061	779
4297	C ₁₂ H ₁₂ O	Ethyl β -naphthyl ether.....	172.09	37.5	282	1.064	1071
4297.1	C ₁₂ H ₁₂ O	<i>l</i> -Methyl- α -naphthyl carbinol.....	172.09	47	116 ¹¹	1.115	
4298	C ₁₂ H ₁₂ O ₂	Benzylideneacetylacetone.....	188.09		188 ¹⁶		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4299	C ₁₂ H ₁₂ O ₂	Allyl cinnamate.....	188.09		286 d.	1.052 ₁₅ ²⁵	
4300	C ₁₂ H ₁₂ O ₂	Benzoylacetylacetone.....	204.09	35	167 ²²	1.152 ₁₅ ¹⁵	
4301	C ₁₂ H ₁₂ O ₂	Brasilic acid.....	252.09	129			
4302	C ₁₂ H ₁₂ O ₂	Phloroglucinol triacetate.....	252.09	106			
4303	C ₁₂ H ₁₂ O ₂	Pyrogallol triacetate.....	252.09	165			
4304	C ₁₂ H ₁₂ N	Dimethyl- α -naphthylamine.....	171.11		276	1.045 ₁₅ ¹⁵	810
4305	C ₁₂ H ₁₂ N	Dimethyl- β -naphthylamine.....	171.11	46	305	1.028 ₁₅ ^{2,2}	1081
4306	C ₁₂ H ₁₂ N	Ethyl α -naphthylamine.....	171.11		176 ¹⁵	1.060	871
4307	C ₁₂ H ₁₂ N	Ethyl β -naphthylamine.....	171.11		183 ¹⁵	1.057	969
4308	C ₁₂ H ₁₂ N	2, 6, 8-Trimethylquinoline.....	171.11	46	261.4		
4309	C ₁₂ H ₁₂ NO ₂	Pyrantin.....	219.11	155			
4310	C ₁₂ H ₁₂ N ₂	<i>p</i> , <i>p'</i> -Diaminodiphenylamine.....	199.12	158			
4311	C ₁₂ H ₁₄ As ₂ Cl ₂ N ₂ O ₂	Arsphenamine.....	438.96	160 d.			
4312	C ₁₂ H ₁₄ IN	Quinaldine ethiodide.....	299.05	234			
4313	C ₁₂ H ₁₄ N ₂ O	<i>p</i> -Tolylantipyrine.....	202.12	137			
4314	C ₁₂ H ₁₄ N ₂ O ₂ S ₂	Benzidine- <i>o</i> , <i>o'</i> -disulfoneamide.....	342.27	278			
4315	C ₁₂ H ₁₄ N ₂ O ₂	Desoxyamalic acid.....	310.14	260 s. d.			
4316	C ₁₂ H ₁₄ N ₂ O ₂	Amalic acid (Tetramethylalloxantine)....	342.14	221 d.			
4317	C ₁₂ H ₁₄ O ₂	<i>n</i> -Propyl cinnamate.....	190.11		285.1	1.044 ⁹	
4318	C ₁₂ H ₁₄ O ₂	Eugenol acetate.....	206.11	31	282.4	1.084	665
4318.1	C ₁₂ H ₁₄ O ₂	Ethyl <i>p</i> -methoxycinnamate.....	206.11	52			1232
4319	C ₁₂ H ₁₄ O ₂	Isoeugenol acetate.....	206.11	80	283		
4322	C ₁₂ H ₁₄ O ₂	Apiol.....	222.11	29.5	294	1.015	1310
4323	C ₁₂ H ₁₄ O ₂	Isoapiol.....	222.11	56	304	1.197 ¹²	817
4324	C ₁₂ H ₁₄ O ₂	Diethyl <i>o</i> -phthalate <i>o</i> -C ₆ H ₄ (CO ₂ C ₂ H ₅) ₂ ..	222.11		296.1	1.122	607
4325	C ₁₂ H ₁₄ N	Carbazoline.....	173.12	99	297		
4326	C ₁₂ H ₁₄ N	Diallylaniline C ₆ H ₅ N(CH ₂ CH=CH ₂) ₂ ...	173.12		245	0.954	
4327	C ₁₂ H ₁₄ N	Julolidine.....	173.12	40	280		
4328	C ₁₂ H ₁₄ NO	Benzoylpiperidine.....	189.12	48	184 ¹⁷		
4329	C ₁₂ H ₁₄ NO	Naphthalanmorpholine.....	189.12	63	312		
4330	C ₁₂ H ₁₄ NO ₂	Dipropionanilide C ₆ H ₅ N(OCC ₂ H ₅) ₂	205.12	44	179.5 ³⁰		
4330.1	C ₁₂ H ₁₄ NO ₂	Ethyl phenaceturate.....	221.12	79			1280
4331	C ₁₂ H ₁₄ NO ₂	Anhalonidine.....	221.12	160			
4332	C ₁₂ H ₁₄ NO ₂	Anhalonine.....	221.12	85.5			
4333	C ₁₂ H ₁₄ NO ₂	Hydrocotarnine.....	221.12	55	100 d.		
4334	C ₁₂ H ₁₄ NO ₂	Cotarnine.....	237.12	133			
4335	C ₁₂ H ₁₄ N ₂ O	Methylecystisine (Caulophylline).....	204.14	137			
4336	C ₁₂ H ₁₆ N ₂ O ₂ S	Aniline sulfate (C ₆ H ₅ NH ₂) ₂ H ₂ SO ₄	284.20			1.377 ⁴	
4337	C ₁₂ H ₁₆ O	Isoamyl phenyl ketone.....	176.12		242.5		
4338	C ₁₂ H ₁₆ O	Isobutyl benzyl ketone.....	176.12		250.5	0.969 ₁₅ ⁹	
4339	C ₁₂ H ₁₆ O ₂	Eugenol ethyl ether.....	192.12		254	1.021 ^{15,5}	808
4340	C ₁₂ H ₁₆ O ₂	Isoeugenol ethyl ether.....	192.12	64			
4341	C ₁₂ H ₁₆ O ₂	Pentamethylbenzoic acid.....	192.12	210.5			
4342	C ₁₂ H ₁₆ O ₂	Amyl benzoate C ₆ H ₅ CO ₂ C ₅ H ₁₁	192.12		d.	0.989	566
4343	C ₁₂ H ₁₆ O ₂	Benzyl isovalerate.....	192.12		136 ²⁵		
4344	C ₁₂ H ₁₆ O ₂	Benzyl <i>d</i> -valerate.....	192.12		250 ⁷³⁰	0.982 ²²	558
4345	C ₁₂ H ₁₆ O ₂	Isoamyl benzoate.....	192.12		262	0.993	
4345.1	C ₁₂ H ₁₆ O ₂	Isopropyl hydrocinnamate.....	192.12		126 ¹¹	0.986 ²⁵	
4346	C ₁₂ H ₁₆ O ₂	Thymyl acetate.....	192.12		243	1.009 ⁹	
4347	C ₁₂ H ₁₆ O ₂	<i>n</i> -Amyl salicylate <i>o</i> -HOC ₆ H ₄ CO ₂ C ₅ H ₁₁ ..	208.12		265	1.065 ¹⁵	
4348	C ₁₂ H ₁₆ O ₂	Butyl anisate <i>p</i> -CH ₃ OC ₆ H ₄ CO ₂ C ₄ H ₉	208.12		183 ⁴⁰	1.054	635
4349	C ₁₂ H ₁₆ O ₂	Isoamyl salicylate.....	208.12		273	1.045 ₁₅ ²⁵	
4350	C ₁₂ H ₁₆ O ₂	Isobutyl anisate.....	208.12		170 ⁴⁶	1.052	634
4351	C ₁₂ H ₁₆ O ₂	Guaiacyl valerate C ₆ H ₅ CO ₂ C ₆ H ₄ OMe...	208.12		265		
4352	C ₁₂ H ₁₆ O ₂	Asaron.....	208.12	67	296	1.165	1333
4353	C ₁₂ H ₁₆ O ₂	Elemicin.....	208.12		147 ¹⁰	1.063	694
4354	C ₁₂ H ₁₆ O ₄	Aspidinol.....	224.12	161			
4355	C ₁₂ H ₁₆ O ₆	Diethyl succinylsuccinate.....	256.12	128			
4356	C ₁₂ H ₁₆ O ₆	<i>d</i> , β -Phenylglucoside.....	256.12	175			
4357	C ₁₂ H ₁₆ O ₇	Arbutin.....	272.12	195			1333
4358	C ₁₂ H ₁₇ As ₂ N ₂ O ₄	Aniline arsenate (C ₆ H ₅ NH ₂) ₂ H ₂ AsO ₄ ...	328.11	140			
4359	C ₁₂ H ₁₇ NO	<i>N</i> - <i>n</i> -Butylacetanilide.....	191.14		276.5		
4360	C ₁₂ H ₁₇ NO	Caproanilide CH ₃ (CH ₂) ₄ CONHC ₆ H ₅ ...	191.14	95			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4361	C ₁₂ H ₁₇ NO	<i>C</i> -Diethylacetanilide.....	191.14	124			
4362	C ₁₂ H ₁₇ NO ₂	Ethyl- <i>N</i> -phenacetine.....	207.14	38	298		
4363	C ₁₂ H ₁₇ NO ₂	Ethyl- <i>o</i> -tolylurethane.....	207.14		255		
4364	C ₁₂ H ₁₇ N ₆ O ₉	Lysine picrate.....	375.17	252 d.			
4365	C ₁₂ H ₁₈	Hexamethylbenzene.....	162.14	166	265		
4365.1	C ₁₂ H ₁₈	1-Methyl-3- <i>tert</i> -amylbenzene.....	162.14		208	0.8673	
4366	C ₁₂ H ₁₈	1, 2, 4-Triethylbenzene.....	162.14		218	0.882	583
4367	C ₁₂ H ₁₈	1, 3, 5-Triethylbenzene.....	162.14		218	0.863	565
4367.1	C ₁₂ H ₁₈ N ₂ O ₄	Rhamnose phenylhydrazone.....	254.16	159			
4367.2	C ₁₂ H ₁₈ N ₂ O ₅	<i>d</i> , α -Glucosephenylhydrazone.....	270.16	160			
4367.3	C ₁₂ H ₁₈ N ₂ O ₅	<i>d</i> , β -Glucosephenylhydrazone.....	270.16	141			
4367.4	C ₁₂ H ₁₈ N ₄ O	Phenylhydrazine hydrate.....	234.17	24			
4367.5	C ₁₂ H ₁₈ N ₄ O ₃	Hexamethylenetetramineresorcinol.....	250.17	200 d.			
4367.6	C ₁₂ H ₁₈ O	Benzyl isoamyl ether.....	178.14		237.5		
4367.7	C ₁₂ H ₁₈ O	Thymyl ethyl ether.....	178.14		226.9	0.933 ₀	
4367.8	C ₁₂ H ₁₈ O	Mellithyl alcohol (CH ₃) ₃ C ₆ CH ₂ OH.....	178.14	160.5			
4367.9	C ₁₂ H ₁₈ O ₃	Phloroglucinol triethyl ether.....	210.14	43	175 ²⁴		
4368	C ₁₂ H ₁₈ O ₃	Pyrogallol triethyl ether.....	210.14	39			
4368.1	C ₁₂ H ₁₈ O ₄	Cascarillin.....	226.14	205			
4368.2	C ₁₂ H ₁₈ O ₆	Trimeric diacetyl.....	258.14	105	280.1		
4368.3	C ₁₂ H ₁₈ O ₆	Diethyl 1, 1'-diacetylsuccinate.....	258.14	88		1.209 (st.)	1196,
						1.176 (met.)	1201
4368.4	C ₁₂ H ₁₈ O ₆	Triethyl aconitate.....	258.14		253 ²⁵⁰	1.106	454
4368.41	C ₁₂ H ₁₈ O ₆	Diethyl diacetyltartrate.....	290.14	68	170 ¹⁵	1.109 ⁷¹	
4368.5	C ₁₂ H ₁₈ Br ₂ O ₂	Bromal <i>d</i> -borneolate.....	434.89	109		1.868 ⁰	
4368.6	C ₁₂ H ₁₈ ClO ₂	<i>d</i> -Bornyl chloroacetate.....	230.60		147 ³⁰		
4368.7	C ₁₂ H ₁₈ Cl ₂ O ₂	Chloral- <i>d</i> -borneolate.....	301.52	56			
4368.8	C ₁₂ H ₁₉ N	<i>n</i> -Dipropylaniline C ₆ H ₅ N(C ₃ H ₇) ₂	177.15		241	0.910	
4368.9	C ₁₂ H ₂₀ N ₂ O ₃	Isoamylisopropylbarbituric acid.....	240.17	175			
4369	C ₁₂ H ₂₀ N ₂ O ₃	Isoamylpropylbarbituric acid.....	270.17	132			
4369.1	C ₁₂ H ₂₀ N ₄ O ₇	Hexamethylenetetraminemethylene citrate.....	332.19	175			
4369.2	C ₁₂ H ₂₀ O	Ballanophorin.....	180.15	56			
4370	C ₁₂ H ₂₀ O	Homophorone.....	180.15		210 ^{42a}	0.886	530
4371	C ₁₂ H ₂₀ O ₂	Geranylacetic acid.....	196.15		179 ¹⁹	0.938	516
4372	C ₁₂ H ₂₀ O ₂	<i>dl</i> -Bornyl acetate.....	196.15		114 ²²	0.985	483
4373	C ₁₂ H ₂₀ O ₂	<i>d</i> -Bornyl acetate.....	196.15	29	226	0.991 ¹⁶	994
4374	C ₁₂ H ₂₀ O ₂	Geranyl acetate.....	196.15		242	0.917 ¹⁶	493
4375	C ₁₂ H ₂₀ O ₂	Isobornyl acetate.....	196.15		89 ⁹	0.981	1010
4375.1	C ₁₂ H ₂₀ O ₂	Isopulegyl acetate.....	196.15		103 ¹⁴	0.935 ¹⁸	934
4376	C ₁₂ H ₂₀ O ₂	<i>l</i> -Linalyl acetate.....	196.15		220	0.895	414
4377	C ₁₂ H ₂₀ O ₂	Neryl acetate.....	196.15		134 ²⁵	0.916 ¹⁶	
4378	C ₁₂ H ₂₀ O ₂	<i>dl</i> , α -Terpinyl acetate.....	196.15	< -50	220 d.	0.957	
4379	C ₁₂ H ₂₀ O ₂	<i>d</i> (<i>l</i>), α -Terpinyl acetate.....	196.15		140 ⁴⁰	0.983 ₀	
4380	C ₁₂ H ₂₀ O ₅	Diethyl 1-ethyl-1'-acetylsuccinate.....	244.15		263	1.064 _{17.6}	
4381	C ₁₂ H ₂₀ O ₇	Triethyl citrate.....	276.15		294	1.137	409
4382	C ₁₂ H ₂₀ O ₁₀	Maltosan.....	324.15	150 (?)			
4383	C ₁₂ H ₂₁ ClO ₂	<i>l</i> -Menthyl chloroacetate.....	232.62	38	137 ¹²	1.056	
4384	C ₁₂ H ₂₁ N ₃	Kyanpropine.....	207.19	116			
4385	C ₁₂ H ₂₁ O	Ethyl <i>d</i> -bornyl ether.....	182.17		205	0.901	1023
4386	C ₁₂ H ₂₁ O	Hexenyl ether.....	182.17		118		
4387	C ₁₂ H ₂₁ O ₂	<i>d</i> -Citronellyl acetate.....	198.17		121 ¹⁵	0.903 ₄ ¹⁶	402
4388	C ₁₂ H ₂₁ O ₂	<i>l</i> -Menthyl acetate (HOCHCO ₂ C ₆ H ₅) ₂	198.17		227	0.919	418
4389	C ₁₂ H ₂₁ O ₃	Lanolic acid.....	214.17	77			
4390	C ₁₂ H ₂₁ O ₃	<i>l</i> -Menthyl glycollate.....	214.17	87			
4391	C ₁₂ H ₂₁ O ₄	Diisoamyl oxalate.....	230.17		265	0.968 ¹¹	
4392	C ₁₂ H ₂₁ O ₆	Di- <i>n</i> -butyl <i>d</i> -tartrate.....	262.17	22.5	203 ¹⁸	1.098 ¹⁶	
4393	C ₁₂ H ₂₁ O ₆	Diisobutyl <i>d</i> -tartrate.....	262.17	69	325		
4393.1	C ₁₂ H ₂₁ O ₆	Diisobutyl <i>l</i> -tartrate.....	262.17	74	185 ²¹	1.029 ⁷⁹	
4394	C ₁₂ H ₂₁ O ₁₁	Lactose.....	342.17	201.6	d.	1.525	1229
4395	C ₁₂ H ₂₁ O ₁₁ (H ₂ O)	Maltose.....	360.19			1.540	1333
4396	C ₁₂ H ₂₁ O ₁₁	Saccharose.....	342.17	186		1.588 ₄ ¹⁶	1242
4397	C ₁₂ H ₂₁ O ₁₁	Trehalose (2H ₂ O).....	342.17	210			1195

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4398	C ₁₂ H ₂₅ ClO	Lauryl chloride CH ₃ (CH ₂) ₁₀ COCl.....	218.64	-17	145 ¹⁸		
4399	C ₁₂ H ₂₅ N	Lauroitrile CH ₃ (CH ₂) ₁₀ CN.....	181.19	4	198 ¹⁰⁰	0.827 ¹⁸	
4400	C ₁₂ H ₂₄	<i>n</i> -Dodecylene CH ₃ :CH(CH ₂) ₉ CH ₃	168.19	-31.5	96 ¹⁸	0.762 ¹⁸	
4401	C ₁₂ H ₂₄ N ₂ O ₁₀	<i>d</i> -Glucosealdazine.....	356.20	100			
4402	C ₁₂ H ₂₄ O	<i>n</i> -Amyl hexyl ketone C ₆ H ₁₁ COC ₆ H ₁₃	184.19	9	112 ⁹		
4403	C ₁₂ H ₂₄ O	Ethylmenthol.....	184.19		85 ⁴	0.904 ¹⁷	
4404	C ₁₂ H ₂₄ O	<i>l</i> -Ethyl menthyl ether.....	184.19		212.9	0.854	918
4405	C ₁₂ H ₂₄ O	Lauric aldehyde CH ₃ (CH ₂) ₁₀ CHO.....	184.19	44.5	185 ¹⁰⁰		
4406	C ₁₂ H ₂₄ O ₂	Lauric acid CH ₃ (CH ₂) ₁₀ CO ₂ H.....	200.19	48.0	225 ¹⁰⁰	0.883	1123
4407	C ₁₂ H ₂₄ O ₂	<i>n</i> -Decyl acetate CH ₃ CO ₂ C ₁₀ H ₂₁	200.19		191.5		1082
4408	C ₁₂ H ₂₄ O ₂	Ethyl <i>n</i> -caprate C ₆ H ₁₃ CO ₂ C ₆ H ₁₃	200.19		245	0.862	
4409	C ₁₂ H ₂₄ O ₂	<i>n</i> -Parabutyraldehyde.....	216.19		100 ²⁵		
4410	C ₁₂ H ₂₅ NO	Lauramide CH ₃ (CH ₂) ₁₀ CONH ₂	199.20	102	200 ^{12.6}		
4411	C ₁₂ H ₂₆	<i>n</i> -Dodecane CH ₃ (CH ₂) ₁₀ CH ₃	170.20	-12	216	0.768	255
4412	C ₁₂ H ₂₆	5-Propylnonane (C ₄ H ₉) ₂ CHC ₄ H ₉	170.20		205	0.756	268
4413	C ₁₂ H ₂₆	2, 4, 5, 7-Tetramethyloctane.....	170.20		210		
4414	C ₁₂ H ₂₆ O	<i>n</i> -Amylhexyl carbinol.....	186.20	30	119 ⁹		
4415	C ₁₂ H ₂₆ O	<i>n</i> -Dodecyl alcohol CH ₃ (CH ₂) ₁₀ CH ₂ OH.....	186.20	24	259	0.831	
4416	C ₁₂ H ₂₆ O	<i>n</i> -Hexyl ether (C ₆ H ₁₃) ₂ O.....	186.20		208.8		
4417	C ₁₂ H ₂₇ N	Dodecylamine C ₁₂ H ₂₅ NH ₂	185.22	28	135 ¹⁸		
4418	C ₁₂ H ₂₇ N	Tri- <i>n</i> -butylamine (C ₄ H ₉) ₃ N.....	185.22		214	0.778 ²⁰	
4419	C ₁₂ H ₂₇ N	Triisobutylamine [(CH ₃) ₂ CHCH ₂] ₃ N.....	185.22	-21.8	191.5	0.766 ²¹	294
4420	C ₁₂ H ₂₈ N ₂ O ₄	Ethylenediamine isovalerate.....	264.23	129			
4421	C ₁₂ H ₇ Br ₃ O ₂	Tribromosalol.....	450.80	195			
4422	C ₁₂ H ₉ Cl ₂ O	<i>p</i> , <i>p'</i> -Dichlorobenzophenone.....	250.98	145			
4423	C ₁₂ H ₉ N ₂ O ₂	<i>p</i> , <i>p'</i> -Dinitrobenzophenone.....	272.08	190			
4424	C ₁₆ H ₉ N ₃ O ₂	<i>o</i> , <i>o'</i> , <i>p</i> , <i>p'</i> -Tetranitrodiphenylurea.....	392.11	189			
4425	C ₁₂ H ₉ O	Fluorenone.....	180.06	84	341.5		
4426	C ₁₂ H ₉ O	Pyrene ketone.....	180.06	142			
4427	C ₁₂ H ₉ O ₂	Xanthone.....	196.06	174	351		
4428	C ₁₂ H ₉ O ₂ S	Benzophenonesulfone.....	244.13	187			
4429	C ₁₂ H ₉ O ₄	Euxanthone.....	228.06	240			
4430	C ₁₂ H ₉ BrO ₂	<i>p</i> -(<i>p</i> -Bromophenyl) benzoic acid.....	276.99	194			
4431	C ₁₂ H ₉ ClO	<i>o</i> -Chlorobenzophenone.....	216.53	45.5	330		
4432	C ₁₂ H ₉ ClO	<i>m</i> -Chlorobenzophenone.....	216.53	83			
4433	C ₁₂ H ₉ ClO	<i>p</i> -Chlorobenzophenone.....	216.53	78	> 300		
4434	C ₁₂ H ₉ N	Acridine.....	179.08	108	346		
4435	C ₁₂ H ₉ N	α -Naphthoquinoline.....	179.08	52	351		
4436	C ₁₂ H ₉ N	β -Naphthoquinoline.....	179.08	93	351		
4437	C ₁₂ H ₉ N	Phenanthradine.....	179.08	104	360		
4438	C ₁₂ H ₉ NO	9-Acridone.....	195.08	354			
4439	C ₁₂ H ₁₀	Fluorene.....	166.08	116	295		
4440	C ₁₂ H ₁₀ AsN	Diphenylcyanoarsine (C ₆ H ₅) ₂ AsCN.....	255.05	30			
4441	C ₁₂ H ₁₀ Cl ₂	Benzophenone chloride.....	236.99		305	1.235 ^{18.5}	
4442	C ₁₂ H ₁₀ Cl ₂	<i>m</i> , <i>m'</i> -Dichlorodiphenylmethane.....	236.99	8	318	1.234 ²¹	
4443	C ₁₂ H ₁₀ Cl ₂	<i>p</i> , <i>p'</i> -Dichlorodiphenylmethane.....	236.99	55	210 ¹⁸		
4444	C ₁₂ H ₁₀ N ₂ O ₂	Benzeneazosalicylic acid.....	242.09	218 d.			
4445	C ₁₂ H ₁₀ O	<i>p</i> -Diphenylaldehyde <i>p</i> -C ₆ H ₅ C ₆ H ₅ CHO.....	182.08	60			
4446	C ₁₂ H ₁₀ O	Fluorenol.....	182.08	156			
4447	C ₁₂ H ₁₀ O	α -Benzophenone (C ₆ H ₅) ₂ CO.....	182.08	48.5	305.4	1.083 ^{62.5}	
4448	C ₁₂ H ₁₀ O	β -Benzophenone.....	182.08	26.5	306	1.108 ²²	1014
4449	C ₁₂ H ₁₀ O	γ -Benzophenone.....	182.08	45-48			
4450	C ₁₂ H ₁₀ O	δ -Benzophenone.....	182.08	-51			
4451	C ₁₂ H ₁₀ O	Xanthene.....	182.08	100.5	315		
4452	C ₁₂ H ₁₀ O ₂	<i>o</i> -Hydroxybenzophenone.....	198.08	41	250 ²²⁰		
4453	C ₁₂ H ₁₀ O ₂	<i>m</i> -Hydroxybenzophenone.....	198.08	116			
4454	C ₁₂ H ₁₀ O ₂	<i>p</i> -Hydroxybenzophenone.....	198.08	134			
4455	C ₁₂ H ₁₀ O ₂	<i>o</i> -Phenylbenzoic acid.....	198.08	111	344		
4456	C ₁₂ H ₁₀ O ₂	<i>m</i> -Phenylbenzoic acid.....	198.08	161			
4457	C ₁₂ H ₁₀ O ₂	<i>p</i> -Phenylbenzoic acid.....	198.08	219			
4458	C ₁₂ H ₁₀ O ₂	Phenyl benzoate C ₆ H ₅ CO ₂ C ₆ H ₅	198.08	70	314	1.235 ²¹	
4459	C ₁₂ H ₁₀ O ₂	2, 5-Dihydroxybenzophenone.....	214.08	122			
4460	C ₁₂ H ₁₀ O ₂	2, 2'-Dihydroxybenzophenone.....	214.08	59	340		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4461	C ₁₃ H ₁₀ O ₂	2, 3'-Dihydroxybenzophenone.....	214.08	126			
4462	C ₁₃ H ₁₀ O ₂	2, 4'-Dihydroxybenzophenone.....	214.08	144			
4463	C ₁₃ H ₁₀ O ₂	3, 4'-Dihydroxybenzophenone.....	214.08	197			
4464	C ₁₃ H ₁₀ O ₂	4, 4'-Dihydroxybenzophenone.....	214.08	210			
4465	C ₁₃ H ₁₀ O ₂	<i>o</i> -Phenoxybenzoic acid.....	214.08	114.5	355 d.		
4466	C ₁₃ H ₁₀ O ₂	Diphenyl carbonate (C ₆ H ₅ O) ₂ CO.....	214.08	81	302		
4467	C ₁₃ H ₁₀ O ₂	Salol <i>o</i> -HOC ₆ H ₄ CO ₂ C ₆ H ₅	214.08	43	173 ¹²	1.250	
4468	C ₁₃ H ₁₀ O ₄	2, 6, 2'-Trihydroxybenzophenone.....	230.08	133			
4469	C ₁₃ H ₁₀ O ₅	Pimpinellin.....	246.08	119			
4470	C ₁₃ H ₁₀ O ₆	Maclurin.....	262.08	220 d.			
4471	C ₁₃ H ₁₀ O ₈	Sordidin.....	294.08	210			
4472	C ₁₃ H ₁₀ S	Thiobenzophenone (C ₆ H ₅) ₂ CS.....	198.14	146.5			
4473	C ₁₃ H ₁₁ N	Benzylidenedianiline C ₆ H ₅ N:CHC ₆ H ₅	181.09	54	300		
4474	C ₁₃ H ₁₁ N	5, 10-Dihydroacridine.....	181.09	169			
4475	C ₁₃ H ₁₁ NO	<i>o</i> -Aminobenzophenone.....	197.09	108			
4476	C ₁₃ H ₁₁ NO	<i>m</i> -Aminobenzophenone.....	197.09	86			
4477	C ₁₃ H ₁₁ NO	<i>p</i> -Aminobenzophenone.....	197.09	124			
4478	C ₁₃ H ₁₁ NO	Benzanilide C ₆ H ₅ NHCOC ₆ H ₅	197.09	161		1.321 ⁴	
4479	C ₁₃ H ₁₁ NO	Benzophenoneoxime (C ₆ H ₅) ₂ C:NOH....	197.09	142			
4480	C ₁₃ H ₁₁ NO	<i>N</i> -Phenylformanilide (C ₆ H ₅) ₂ NOCH....	197.09	74	220	1.230	
4481	C ₁₃ H ₁₁ NO ₂	<i>o</i> -Benzoylaminophenol.....	213.09	167 d.			
4482	C ₁₃ H ₁₁ NO ₂	<i>m</i> -Benzoylaminophenol.....	213.09	174			
4483	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Benzoylaminophenol.....	213.09	227			
4484	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Nitrodiphenylmethane.....	213.09	31			
4485	C ₁₃ H ₁₁ NO ₂	Salicylanilide <i>o</i> -OHC ₆ H ₄ CONHC ₆ H ₅	213.09	135			
4486	C ₁₃ H ₁₁ NO ₂	<i>p</i> -Aminosalol.....	229.09	152			
4487	C ₁₃ H ₁₁ NO ₄	Gallanilide.....	245.09	205			
4488	C ₁₃ H ₁₁ N ₂	2, 8-Diaminoacridine.....	209.11	284			
4489	C ₁₃ H ₁₁ O ₅	Gelsemic acid.....	247.09	206			
4490	C ₁₃ H ₁₂	Diphenylmethane (C ₆ H ₅) ₂ CH ₂	168.09	27	262	1.006	1030
4491	C ₁₃ H ₁₂	<i>o</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09		260		
4492	C ₁₃ H ₁₂	<i>m</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09		277	1.031 ⁹	
4493	C ₁₃ H ₁₂	<i>p</i> -Phenyltoluene CH ₃ C ₆ H ₄ C ₆ H ₅	168.09	-3	267	1.015 ²⁷	
4494	C ₁₃ H ₁₂ N ₂	Benzaldehyde phenylhydrazine.....	196.11	156			
4495	C ₁₃ H ₁₂ N ₂ O	1-Benzoyl-1-phenylhydrazine.....	212.11	70			
4496	C ₁₃ H ₁₂ N ₂ O	1-Benzoyl-2-phenylhydrazine.....	212.11	168			
4497	C ₁₃ H ₁₂ N ₂ O	<i>o</i> , <i>o'</i> -Diaminobenzophenone.....	212.11	135			
4498	C ₁₃ H ₁₂ N ₂ O	<i>m</i> , <i>m'</i> -Diaminobenzophenone.....	212.11	174			
4499	C ₁₃ H ₁₂ N ₂ O	<i>p</i> , <i>p'</i> -Diaminobenzophenone.....	212.11	237			
4500	C ₁₃ H ₁₂ N ₂ O	1, 2-Diphenylurea CO(NHC ₆ H ₅) ₂	212.11	235	260		1329
4501	C ₁₃ H ₁₂ N ₂ O	1, 1-Diphenylurea (C ₆ H ₅) ₂ NCONH ₂	212.11	189			
4502	C ₁₃ H ₁₂ N ₂ O	Harmine.....	212.11	257 d.			
4503	C ₁₃ H ₁₂ N ₂ O ₂	<i>o</i> -Nitrobenzylaniline.....	228.11	44; 57			
4504	C ₁₃ H ₁₂ N ₂ S	1, 2-Diphenylthiourea.....	228.17	154	d.	1.321 ⁴	
4505	C ₁₃ H ₁₂ O	<i>o</i> -Benzylphenol C ₆ H ₅ CH ₂ C ₆ H ₄ OH....	184.09	21	312		
4506	C ₁₃ H ₁₂ O	<i>p</i> -Benzylphenol C ₆ H ₅ CH ₂ C ₆ H ₄ OH....	184.09	84	322		
4507	C ₁₃ H ₁₂ O	Diphenyl carbinol (C ₆ H ₅) ₂ CHOH.....	184.09	68	298.5		
4508	C ₁₃ H ₁₂ O	Benzyl phenyl ether C ₆ H ₅ OCH ₂ C ₆ H ₅	184.09	39	287		
4509	C ₁₃ H ₁₂ O ₂ S	Phenyl- <i>p</i> -toluenesulfonate.....	248.16	96			
4512	C ₁₃ H ₁₂ N	Benzylaniline C ₆ H ₅ NHCH ₂ C ₆ H ₅	183.11	37	300	1.038 ²⁴	
4513	C ₁₃ H ₁₂ N	<i>N</i> -Methyldiphenylamine (C ₆ H ₅) ₂ NCH ₃ ..	183.11	-7.6	293.4	1.047 ²⁵	
4514	C ₁₃ H ₁₂ NO	<i>m</i> -(<i>o</i> -Tolylamino) phenol.....	199.11		375		
4515	C ₁₃ H ₁₂ NO	<i>p</i> -(<i>m</i> -Tolylamino) phenol.....	199.11	91	350		
4517	C ₁₃ H ₁₂ NO ₂ S	Toluene- <i>p</i> -sulfoneanilide.....	247.17	103			
4518	C ₁₃ H ₁₂ N ₂	Diphenylguanidine.....	211.12	148			
4519	C ₁₃ H ₁₄ N ₂	<i>o</i> , <i>p'</i> -Diaminodiphenylmethane.....	198.12	88			
4520	C ₁₃ H ₁₄ N ₂	<i>m</i> , <i>m'</i> -Diaminodiphenylmethane.....	198.12	48			
4521	C ₁₃ H ₁₄ N ₂	<i>m</i> , <i>p'</i> -Diaminodiphenylmethane.....	198.12	90			
4522	C ₁₃ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Diaminodiphenylmethane.....	198.12	89			
4523	C ₁₃ H ₁₄ N ₂	1-Phenyl-2-benzylhydrazine.....	198.12	26			
4524	C ₁₃ H ₁₄ N ₂ O	Harmaline.....	214.12	238			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4525	C ₁₃ H ₁₄ N ₂ O ₂	Analgen (5-Acetylamino-8-ethoxyquinoline).....	230.12	155			
4526	C ₁₃ H ₁₄ N ₂ S	1, 2-Di-(<i>p</i> -aminophenyl) thiourea.....	258.21	195			
4526.1	C ₁₃ H ₁₄ O ₂	Isobutyl phenylpropionate.....	202.11		176 ¹²	1.158 ²⁵	
4527	C ₁₃ H ₁₄ O ₄	Drimine.....	234.11	256			
4528	C ₁₃ H ₁₄ Cl ₂ N ₂ O ₂	Chloralantipyrine.....	353.51	68			
4529	C ₁₃ H ₁₄ N	2, 5, 6, 8-Tetramethylquinoline.....	185.12	20	300		
4530	C ₁₃ H ₁₄ IN	2, 4-Dimethylquinoline ethiodide.....	313.06	225			
4530.1	C ₁₃ H ₁₄ N ₂ O	4-Ethyl antipyrine.....	216.14	68			1237
4530.2	C ₁₃ H ₁₄ N ₂ O	1-Phenyl-2-propyl-3-methylpyrazolone...	216.14	93			1262
4530.3	C ₁₃ H ₁₆ O	Benzalpinacoline.....	188.12	39.5		0.939 ⁶⁰	1048
4531	C ₁₃ H ₁₆ O ₂	Ethyl benzylacetoacetate.....	220.12		290 d.	1.036 ¹⁴	
4532	C ₁₃ H ₁₆ O ₂	Isoeugenol propionate.....	220.12		292		
4533	C ₁₃ H ₁₆ O ₄	Ethyl phenylmalonate.....	236.12		285 d.	1.095 ²⁵	
4534	C ₁₃ H ₁₆ O ₇	<i>l</i> -Helicin.....	284.12	175			
4535	C ₁₃ H ₁₆ O ₇	Salinigrin.....	284.12	195			
4536	C ₁₃ H ₁₇ NO ₄	Thermodin.....	251.14	88			1333
4537	C ₁₃ H ₁₇ N ₂ O	Pyramidon.....	231.16	108			
4538	C ₁₃ H ₁₇ BrNO ₂	Phenoval.....	300.06	150			
4539	C ₁₃ H ₁₈ N ₂ O	Eseroline.....	218.16	127			
4541	C ₁₆ H ₁₈ N ₄ O ₆ S	Hexamethylenetetramine salicylsulfonic acid (Hexal).....	358.24	190 d.			
4542	C ₁₆ H ₁₈ O	Phenyl hexyl ketone C ₆ H ₅ COC ₆ H ₁₃	190.14	17	271.5		
4543	C ₁₃ H ₁₈ O ₂	Eugenol propyl ether.....	206.14		270.5	1.002	
4544	C ₁₃ H ₁₈ O ₂	Phenyl heptylate C ₆ H ₅ CO ₂ C ₆ H ₅	206.14		282.3	0.982 ¹⁵	
4545	C ₁₃ H ₁₈ O ₂	Isoamyl anisate.....	222.14		188 ²⁰	1.040	638
4546	C ₁₃ H ₁₈ O ₇	Methylarbutin.....	286.14	175			
4547	C ₁₃ H ₁₈ O ₇	Salicin.....	286.14	201.5	240	1.434 ²⁴	
4548	C ₁₃ H ₁₈ O ₈	Calmatambetin.....	302.14	148			
4549	C ₁₆ H ₁₉ NO	Heptanilide CH ₃ (CH ₂) ₄ CONHC ₆ H ₅	205.15	71			
4550	C ₁₃ H ₁₉ NO ₂	Benzalaminoacetal.....	221.15		220 ¹⁰⁰		
4551	C ₁₃ H ₁₉ NO ₂	Dioscorine.....	221.15	43.5			
4552	C ₁₃ H ₁₉ NO ₂	Pellotine.....	237.15	111			1333
4553	C ₁₃ H ₁₉ NO ₃	Gynocardine.....	333.15	162			
4554	C ₁₃ H ₁₉ O ₈	Aucubine.....	303.15	181			
4555	C ₁₃ H ₂₀ ClNO ₂	Dioscorine hydrochloride.....	257.62	204			
4556	C ₁₆ H ₂₀ ClNO ₂	Gujasanol (Diethylaminoacetic acid guaiacol hydrochloride).....	273.62	184			
4557	C ₁₃ H ₂₀ N ₂ O ₂	Novocaine.....	236.17	60			
4558	C ₁₃ H ₂₀ N ₂ O ₂ (2H ₂ O)	Novocaine.....	272.19	51			
4559	C ₁₃ H ₂₀ O	α -Ionone.....	192.15		147.5 ²⁸	0.930	988
4560	C ₁₃ H ₂₀ O	β -Ionone.....	192.15		140 ¹⁸	0.944	667, 951
4561	C ₁₃ H ₂₀ O	Irone.....	192.15		144 ¹⁴	0.939	605
4562	C ₁₃ H ₂₀ O	Lactucol.....	192.15	160			
4563	C ₁₆ H ₂₀ O	Pseudoionone.....	192.15		170 ²⁸	0.897	1001
4564	C ₁₃ H ₂₀ O ₂	Galbanic acid.....	208.15	156			
4565	C ₁₃ H ₂₁ ClN ₂ O ₂	Novocaine hydrochloride.....	272.64	156			
4566	C ₁₃ H ₂₁ ClN ₂ O ₂	Procaine.....	272.64	155			
4567	C ₁₃ H ₂₁ N	<i>N</i> -Ethyl-isoamylaniline.....	191.17		262		
4568	C ₁₃ H ₂₁ NO ₄	Meteloidine.....	255.17	141			
4569	C ₁₃ H ₂₁ BrNO ₄	Meteloidine hydrobromide.....	336.09	250			
4570	C ₁₃ H ₂₂ N ₂ O ₃	Ethylheptylbarbituric acid.....	254.19	119			
4571	C ₁₃ H ₂₂ O	Zeorin.....	194.17	251			
4572	C ₁₃ H ₂₂ O ₂	<i>d</i> -Bornyl propionate.....	210.27		110 ¹¹	0.979 ¹⁵	857
4573	C ₁₃ H ₂₂ O ₂	<i>l</i> -Menthyl pyruvate.....	226.17		140 ²²	0.985	
4574	C ₁₃ H ₂₂ O ₇	Taxicatin.....	290.17	171			
4575	C ₁₃ H ₂₄ NO ₂	Cuscohygrine.....	226.19		170 ²²		
4576	C ₁₃ H ₂₄ O	Allyl <i>l</i> -menthyl ether.....	196.19		104 ¹³	0.876	
4577	C ₁₃ H ₂₄ O	Geranylacetone.....	196.19		139 ¹⁹		
4578	C ₁₃ H ₂₄ O ₂	<i>l</i> -Menthyl propionate.....	212.19		118 ¹⁵	0.918	
4579	C ₁₃ H ₂₄ O ₂	<i>l</i> -Menthyl <i>dl</i> -lactate.....	228.19	32	142 ¹⁵	0.984	
4580	C ₁₃ H ₂₄ O ₄	Brassylic acid.....	244.19	114			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4580.1	C ₁₃ H ₂₄ O ₄	Di- <i>l</i> -amyl malonate.....	244.19		154 ¹³	0.962 ²⁸	
4581	C ₁₃ H ₂₄	Tridecylene.....	182.20		232.7	0.845 ⁹	
4582	C ₁₃ H ₂₄ O ₂	Tridecylic acid CH ₃ (CH ₂) ₁₁ CO ₂ H.....	214.20	51	236 ¹⁰⁰		
4583	C ₁₃ H ₂₄ O ₂	Isoamyl caprylate.....	214.20		136 ¹⁰		
4584	C ₁₃ H ₂₄ O ₂	Methyl laurate C ₁₁ H ₂₂ CO ₂ CH ₃	214.20	5	148 ¹⁸		
4585	C ₁₃ H ₂₄	Dipropylhexylmethane (C ₃ H ₇) ₂ CHC ₆ H ₁₃	184.22		221.2	0.765 ^{14,4}	299
4586	C ₁₃ H ₂₄	Tributylmethane (C ₄ H ₉) ₃ CH.....	184.22			0.760	300
4587	C ₁₃ H ₂₄	<i>n</i> -Tridecane CH ₃ (CH ₂) ₁₁ CH ₃	184.22	-6.2	234	0.757	908
4588	C ₁₃ H ₂₄ O	Di- <i>n</i> -hexylcarbinol (C ₆ H ₁₃) ₂ CHOH.....	200.22	42			
4589	C ₁₃ H ₂₄ O	<i>n</i> -Tridecyl alcohol CH ₃ (CH ₂) ₁₁ CH ₂ OH.....	200.22	30.5	156 ¹⁵	0.822 ²¹	
4590	C ₁₃ H ₂₄ N	Tridecylamine CH ₃ (CH ₂) ₁₁ CH ₂ NH ₂	199.23	27	265		
4591	C ₁₃ H ₈ Cl ₈	Octachloroanthracene.....	453.68	>350			
4592	C ₁₃ H ₈ Cl ₇	Heptachloroanthracene.....	419.23	>350			
4593	C ₁₃ H ₄ Cl ₄ O ₂	1, 2, 3, 4-Tetrachloroanthraquinone.....	345.86	191			
4594	C ₁₃ H ₄ Cl ₄ O ₂	β -Tetrachloroanthraquinone.....	345.86	330			
4595	C ₁₃ H ₄ Cl ₆	Hexachloroanthracene.....	384.78	330			
4596	C ₁₃ H ₄ Cl ₂ O ₂	α -1, 2-Dichloroanthraquinone.....	276.96	161			
4597	C ₁₃ H ₄ Cl ₂ O ₂	β -1, 2-Dichloroanthraquinone.....	276.96	207			
4598	C ₁₃ H ₄ Cl ₂ O ₂	1, 4-Dichloroanthraquinone.....	276.96	187.5			
4599	C ₁₃ H ₄ Cl ₂ O ₂	1, 5-Dichloroanthraquinone.....	276.96	232			
4600	C ₁₃ H ₄ Cl ₂ O ₂	1, 6-Dichloroanthraquinone.....	276.96	204			
4601	C ₁₃ H ₄ Cl ₂ O ₂	1, 8-Dichloroanthraquinone.....	276.96	199			
4602	C ₁₃ H ₄ Cl ₂ O ₂	2, 3-Dichloroanthraquinone.....	276.96	267			
4603	C ₁₃ H ₄ Cl ₂ O ₂	2, 6-Dichloroanthraquinone.....	276.96	282			
4604	C ₁₃ H ₄ Cl ₂ O ₂	2, 7-Dichloroanthraquinone.....	276.96	211			
4605	C ₁₃ H ₄ Cl ₄	1, 2, 3, 4-Tetrachloroanthracene.....	315.88	149			
4606	C ₁₃ H ₄ Cl ₄	α -Tetrachloroanthracene.....	315.88	220			
4607	C ₁₃ H ₄ Cl ₄	β -Tetrachloroanthracene.....	315.88	152			
4608	C ₁₃ H ₄ N ₂ O ₄	1, 3-Dinitroanthraquinone.....	298.06	240			
4609	C ₁₃ H ₈ O ₃	Ellagic acid.....	302.05			1.667 ¹⁶	
4610	C ₁₃ H ₇ ClO ₂	1-Chloroanthraquinone.....	242.51	162			
4611	C ₁₃ H ₇ ClO ₂	2-Chloroanthraquinone.....	242.51	208			
4612	C ₁₃ H ₇ ClO ₂	3-Chloroanthraquinone.....	242.51	204			
4613	C ₁₃ H ₇ NO ₄	1-Nitroanthraquinone.....	253.06	230			
4614	C ₁₃ H ₇ NO ₄	2-Nitroanthraquinone.....	253.06	181			
4615	C ₁₃ H ₇ NO ₄	4-Nitro- α -alizarin.....	285.06	289			
4616	C ₁₃ H ₇ NO ₄	3-Nitro- β -alizarin.....	285.06	244			
4617	C ₁₃ H ₈ Br ₂	9, 10-Dibromoanthracene.....	335.89	221			
4618	C ₁₃ H ₈ Cl ₂	1, 2-Dichloroanthracene.....	246.98	255			
4619	C ₁₃ H ₈ Cl ₂	9, 10-Dichloroanthracene.....	246.98	209			
4620	C ₁₃ H ₈ O ₂	Anthraquinone C ₆ H ₄ :(CO) ₂ :C ₆ H ₄	208.06	285	379.8	1.438	
4621	C ₁₃ H ₈ O ₂	Isoanthraquinone.....	208.06	212			
4622	C ₁₃ H ₈ O ₂	Phenanthraquinone.....	208.06	207	360	1.405	
4623	C ₁₃ H ₈ O ₂	3, 4-Phenanthraquinone.....	208.06	133			
4624	C ₁₃ H ₈ O ₂	2-Hydroxyanthraquinone.....	224.06	302			
4625	C ₁₃ H ₈ O ₂	Diphenic anhydride.....	224.06	219			
4626	C ₁₃ H ₈ O ₄	Alizarin.....	240.06	290	430		
4627	C ₁₃ H ₈ O ₄	Anthraflavic acid.....	240.06	330			
4628	C ₁₃ H ₈ O ₄	Anthrarufin.....	240.06	280			
4629	C ₁₃ H ₈ O ₄	1, 6-Dihydroxyanthraquinone.....	240.06	272			
4630	C ₁₃ H ₈ O ₄	1, 7-Dihydroxyanthraquinone.....	240.06	292			
4631	C ₁₃ H ₈ O ₄	Chrysazin.....	240.06	191			
4632	C ₁₃ H ₈ O ₄	Hystazarin (2, 3-Dihydroxyanthraquinone).....	240.06	>280			
4633	C ₁₃ H ₈ O ₄	Quinizarin.....	240.06	195			
4634	C ₁₃ H ₈ O ₄	Xanthopurpurin.....	240.06	263			
4635	C ₁₃ H ₈ O ₆	Anthragallol.....	256.06	310	s. 290		
4636	C ₁₃ H ₈ O ₆	Anthrapurpurin.....	256.06	330	462		
4637	C ₁₃ H ₈ O ₆	Flavopurpurin.....	256.06	>360	459		
4638	C ₁₃ H ₈ O ₆	Purpurin.....	256.06	256			
4639	C ₁₃ H ₈ O ₆	1, 4, 6-Trihydroxyanthraquinone.....	256.06	>300			
4640	C ₁₃ H ₈ Cl	1-Chloroanthracene.....	212.53	82		1.171 ^{10,5}	1140
4641	C ₁₃ H ₈ Cl	9-Chloroanthracene.....	212.53	103			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4642	C ₁₄ H ₉ NO ₂	1-Aminoanthraquinone.....	223.08	256			
4643	C ₁₄ H ₉ NO ₂	2-Aminoanthraquinone.....	223.08	302			
4644	C ₁₄ H ₉ NO ₂	9-Nitroanthracene.....	223.08	146			
4645	C ₁₄ H ₉ NO ₂	2-Nitrophenanthrene.....	223.08	99			
4646	C ₁₄ H ₉ NO ₂	3-Nitrophenanthrene.....	223.08	170			
4647	C ₁₄ H ₉ NO ₂	4-Nitrophenanthrene.....	223.08	80			
4648	C ₁₄ H ₉ NO ₂	9-Nitrophenanthrene.....	223.08	116			
4649	C ₁₄ H ₁₀	Anthracene C ₆ H ₄ :(CH) ₂ :C ₆ H ₄	178.08	218	342	1.25 ₄ ²⁷	
4650	C ₁₄ H ₁₀	Diphenylacetylene C ₆ H ₅ CC:C ₆ H ₅	178.08	60	300		
4651	C ₁₄ H ₁₀	Isoanthracene.....	178.08	134.5			
4652	C ₁₄ H ₁₀	Phenanthrene.....	178.08	99.6	340.2	1.025	1158
4653	C ₁₄ H ₁₀ Cl ₂	Dichlorostilbene.....	248.99	170			
4654	C ₁₄ H ₁₀ Cl ₂	α-Tolane dichloride.....	248.99	143	183 ¹⁸		
4655	C ₁₄ H ₁₀ Cl ₂	β-Tolane dichloride.....	248.99	63	178 ¹⁸		
4656	C ₁₄ H ₁₀ Cl ₄	Tolane tetrachloride.....	319.91	163			
4656.1	C ₁₄ H ₁₀ N ₂ O ₂	Phthalylphenylhydrazine.....	238.09	179		1.356	
4657	C ₁₄ H ₁₀ N ₂ O ₂	α-Diaminoanthraquinone.....	238.09	236			
4658	C ₁₄ H ₁₀ N ₂ O ₂	β-Diaminoanthraquinone.....	238.09	>300			
4659	C ₁₄ H ₁₀ N ₂ O ₂	<i>p</i> , <i>p'</i> -Azoxybenzaldehyde.....	254.09	194			
4660	C ₁₄ H ₁₀ N ₂ O ₄	<i>o</i> , <i>o'</i> -Azobenzoic acid.....	270.09	237			
4661	C ₁₄ H ₁₀ N ₂ O ₄	<i>m</i> , <i>m'</i> -Azobenzoic acid.....	270.09	340			
4662	C ₁₄ H ₁₀ N ₂ O ₄	α- <i>p</i> , <i>p'</i> -Dinitrostilbene.....	270.09	285			
4663	C ₁₄ H ₁₀ N ₂ O ₄	β- <i>p</i> , <i>p'</i> -Dinitrostilbene.....	270.09	216			
4664	C ₁₄ H ₁₀ N ₂ O ₄	<i>o</i> , <i>o'</i> -Azoxybenzoic acid.....	286.09	240			
4665	C ₁₄ H ₁₀ N ₂ O ₄	<i>m</i> , <i>m'</i> -Azoxybenzoic acid.....	286.09	320			
4666	C ₁₄ H ₁₀ N ₂ O ₄	<i>p</i> , <i>p'</i> -Azoxybenzoic acid.....	286.09	240 d.			
4667	C ₁₄ H ₁₀ O	Anthranol.....	194.08	170 d.			
4668	C ₁₄ H ₁₀ O	1-Anthrol (1-Hydroxyanthracene).....	194.08	153			
4669	C ₁₄ H ₁₀ O	2-Anthrol.....	194.08	200 d.			
4670	C ₁₄ H ₁₀ O	Diphenylketene (C ₆ H ₅) ₂ C:CO.....	194.08		146 ¹³	1.104	
4671	C ₁₄ H ₁₀ O	Phenanthrone.....	194.08	152			
4672	C ₁₄ H ₁₀ O ₂	Benzil C ₆ H ₅ COCOC ₆ H ₅	210.08	95.2	348	1.521 ₄ ^{13,3}	1186
4673	C ₁₄ H ₁₀ O ₂	Chrysazol.....	210.08	220 d.			
4674	C ₁₄ H ₁₀ O ₂	Flavene.....	210.08	270			
4675	C ₁₄ H ₁₀ O ₂	3, 4-Dihydroxyphenanthrene.....	210.08	143			
4676	C ₁₄ H ₁₀ O ₂	Benzoic anhydride (C ₆ H ₅ CO) ₂ O.....	226.08	43	360	1.199 ₄ ¹⁶	
4677	C ₁₄ H ₁₀ O ₂	<i>o</i> -Benzoylbenzoic acid.....	226.08	127			
4678	C ₁₄ H ₁₀ O ₂	<i>m</i> -Benzoylbenzoic acid.....	226.08	162			
4679	C ₁₄ H ₁₀ O ₂	<i>p</i> -Benzoylbenzoic acid.....	226.08	194			
4680	C ₁₄ H ₁₀ O ₂	Desoxyalizarin.....	226.08	208			
4681	C ₁₄ H ₁₀ O ₂	Disalicylic aldehyde.....	226.08	128			
4682	C ₁₄ H ₁₀ O ₄	Benzoylsalicylic acid.....	242.08	207			
4683	C ₁₄ H ₁₀ O ₄	1, 8-Diphenic acid.....	242.08	252			
4684	C ₁₄ H ₁₀ O ₄	1, 9-Diphenic acid.....	242.08	216			
4685	C ₁₄ H ₁₀ O ₄	1, 10-Diphenic acid.....	242.08	228			
4686	C ₁₄ H ₁₀ O ₄	2, 9-Diphenic acid.....	242.08	340			
4687	C ₁₄ H ₁₀ O ₄	Diphenyl oxalate (CO ₂ C ₆ H ₅) ₂	242.08	136 d.	325 s. d.		
4688	C ₁₄ H ₁₀ O ₄	Benzoyl peroxide (C ₆ H ₅ CO ₂) ₂	242.08	104	d.		1235
4689	C ₁₄ H ₁₀ O ₄ S ₂	Dithiosalicylic acid.....	306.21	290			
4690	C ₁₄ H ₁₀ O ₆	Gentianin.....	258.08	267	400		
4691	C ₁₄ H ₁₀ O ₆	Gentienin.....	258.08	225			
4692	C ₁₄ H ₁₀ O ₆	Salicylosalicylic acid.....	258.08	148			
4693	C ₁₄ H ₁₀ O ₆	Aponic acid.....	274.08	252 d.			
4694	C ₁₄ H ₁₀ O ₉	Tannin.....	322.08	200 d.			
4695	C ₁₄ H ₁₁ N	α-Anthramine C ₆ H ₄ :(CH) ₂ :C ₆ H ₄ NH ₂	193.09	130			
4696	C ₁₄ H ₁₁ N	β-Anthramine C ₆ H ₄ :(CH) ₂ :C ₆ H ₄ NH ₂	193.09	238			
4697	C ₁₄ H ₁₁ N	<i>o</i> -Benzylbenzonitrile.....	193.09	19	314		
4698	C ₁₄ H ₁₁ N	1-Methylacridine.....	193.09	88			
4699	C ₁₄ H ₁₁ N	3-Methylacridine.....	193.09	134			
4700	C ₁₄ H ₁₁ N	5-Methylacridine.....	193.09	114	360 ⁷⁴⁰		
4701	C ₁₄ H ₁₁ N	α-Naphthoquinaldine.....	193.09		>300		
4702	C ₁₄ H ₁₁ N	β-Naphthoquinaldine.....	193.09	82	>300		
4703	C ₁₄ H ₁₁ N	γ-Naphthoquinaldine.....	193.09	92			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4704	C ₁₄ H ₁₁ NO ₂	α-Benziloxime C ₆ H ₅ COC(:NOH)C ₆ H ₅ ...	225.09	138			
4705	C ₁₄ H ₁₁ NO ₂	Dibenzohydroxamic acid.....	241.09	161			
4706	C ₁₄ H ₁₁ NO ₄	Disalicylamide.....	257.09	200 d.			
4707	C ₁₄ H ₁₂	1, 1-Diphenylethylene (C ₆ H ₅) ₂ C:CH ₂ ...	180.09	9	277	1.038 ₄ ¹⁴	837
4708	C ₁₄ H ₁₂	Stilbene C ₆ H ₅ CH:CHC ₆ H ₅	180.09	124	307	0.970 ₁₃ ¹⁵	
4709	C ₁₄ H ₁₂ N ₂	Benzalazine C ₆ H ₅ CH:N.NCH:C ₆ H ₅ ...	208.11	93			
4710	C ₁₄ H ₁₂ N ₂	Orexine.....	208.11	95		1.290 ⁴	
4711	C ₁₄ H ₁₂ N ₂	Tolazone.....	208.11	187	>360		
4712	C ₁₄ H ₁₂ N ₂ O ₂	α-Benzildioxime (C ₆ H ₅ C:NOH) ₂	240.11		237 d.		
4713	C ₁₄ H ₁₂ N ₂ O ₂	β-Benzildioxime.....	240.11	105			
4714	C ₁₄ H ₁₂ N ₂ O ₂	γ-Benzildioxime.....	240.11	165			
4715	C ₁₄ H ₁₂ N ₂ O ₂	Oxanilide (CONHC ₆ H ₅) ₂	240.11	250	320		
4716	C ₁₄ H ₁₂ N ₂ O ₄	Di- <i>o</i> -aminophenyl oxalate.....	272.11	167.5 d.			
4717	C ₁₄ H ₁₂ N ₂ O ₄	Di- <i>m</i> -aminophenyl oxalate.....	272.11	180 d.			
4718	C ₁₄ H ₁₂ N ₂ O ₄	Di- <i>p</i> -aminophenyl oxalate.....	272.11	220 d.			
4719	C ₁₄ H ₁₂ N ₂ O ₄	Hydrazo- <i>o</i> -benzoic acid.....	272.11	205			
4722	C ₁₄ H ₁₂ N ₂ S	Dehydrothio- <i>p</i> -toluidine.....	240.17	191	434		
4723	C ₁₄ H ₁₂ O	Diphenylacetaldehyde.....	196.09		193 ³⁷	1.100	775
4724	C ₁₄ H ₁₂ O	Phenyl benzyl ketone.....	196.09	60	322		
4725	C ₁₄ H ₁₂ O	Phenyl <i>o</i> -tolyl ketone.....	196.09	> -18	316		
4726	C ₁₄ H ₁₂ O	Phenyl <i>m</i> -tolyl ketone.....	196.09		316.5	1.088 _{17.5} ³	
4727	C ₁₄ H ₁₂ O	Phenyl <i>p</i> -tolyl ketone.....	196.09	60	326.5		1188
4728	C ₁₄ H ₁₂ O ₂	Benzoin C ₆ H ₅ COCH(OH)C ₆ H ₅	212.09	133	344		
4729	C ₁₄ H ₁₂ O ₂	<i>o</i> -Benzylbenzoic acid.....	212.09	114			
4730	C ₁₄ H ₁₂ O ₂	<i>m</i> -Benzylbenzoic acid.....	212.09	108			
4731	C ₁₄ H ₁₂ O ₂	<i>p</i> -Benzylbenzoic acid.....	212.09	155			
4732	C ₁₄ H ₁₂ O ₂	Diphenylacetic acid (C ₆ H ₅) ₂ CHCO ₂ H...	212.09	148			
4733	C ₁₄ H ₁₂ O ₂	Benzyl benzoate C ₆ H ₅ CO ₂ CH ₂ C ₆ H ₅ ...	212.09	18.5	324	1.114 _{18.5} ³	
4734	C ₁₄ H ₁₂ O ₂	<i>p</i> -Cresyl benzoate <i>p</i> -CH ₃ C ₆ H ₄ O ₂ CC ₆ H ₅ ...	212.09	71.5	316		
4735	C ₁₄ H ₁₂ O ₂	Benzyl salicylate.....	228.09		214 _{22.5} ³		
4736	C ₁₄ H ₁₂ O ₂	<i>m</i> -Cresyl benzoate C ₆ H ₅ CO ₂ C ₆ H ₄ CH ₃ ...	212.09	55			
4737	C ₁₄ H ₁₂ O ₂	Trihydroxydihydroanthracene.....	228.09	256			
4738	C ₁₄ H ₁₂ O ₂	Benzilic acid (C ₆ H ₅) ₂ C(OH)CO ₂ H.....	228.09	150			
4739	C ₁₄ H ₁₂ O ₂	Amyrolin.....	228.09	124		1.351 ¹⁸	1312
4740	C ₁₄ H ₁₂ O ₂	Benzosol C ₆ H ₅ CO ₂ C ₆ H ₄ (OCH ₃)- <i>o</i>	228.09	61			
4741	C ₁₄ H ₁₂ O ₂	<i>o</i> -Cresyl salicylate.....	228.09	35			
4742	C ₁₄ H ₁₂ O ₂	<i>m</i> -Cresyl salicylate.....	228.09	74			
4743	C ₁₄ H ₁₂ O ₂	<i>p</i> -Cresyl salicylate.....	227.09	39			
4744	C ₁₄ H ₁₂ O ₄	Cotoin.....	224.09	129			
4745	C ₁₄ H ₁₂ O ₄	Isocotoin.....	244.09	162			
4746	C ₁₄ H ₁₂ O ₄	Guaiacyl salicylate.....	244.09	65			
4747	C ₁₄ H ₁₂ O ₆	Gardenin.....	276.09	164			
4748	C ₁₄ H ₁₂ NO	<i>N</i> -Benzoyl- <i>o</i> -toluidine.....	211.11	143			1296
4749	C ₁₄ H ₁₂ NO	<i>N</i> -Benzoyl- <i>m</i> -toluidine.....	211.11	125			1299
4750	C ₁₄ H ₁₂ NO	<i>N</i> -Benzoyl- <i>p</i> -toluidine.....	211.11	158	232		1291
4751	C ₁₄ H ₁₂ NO	<i>o</i> -Benzylbenzamide.....	211.11	163			
4752	C ₁₄ H ₁₂ NO	<i>N</i> -Diphenylacetamide.....	211.11	103			1281
4753	C ₁₄ H ₁₂ NO	Phenylacetanilide.....	211.11	117			
4754	C ₁₄ H ₁₂ NO ₂	Benzoylanisidine.....	227.11	154			
4755	C ₁₄ H ₁₂ N ₂ O	<i>m</i> -Acetylaminobenzene.....	239.12	131			
4756	C ₁₄ H ₁₄	Dibenzyl (C ₆ H ₅ CH ₂) ₂	182.11	52.5	284	0.942 ₄ ^{10.6}	1118
4757	C ₁₄ H ₁₄	1, 1-Diphenylethane (C ₆ H ₅) ₂ CHCH ₃ ...	182.11		272	1.006 ₀ ²¹	763
4758	C ₁₄ H ₁₄	<i>o</i> , <i>o'</i> -Ditolyl (CH ₂ C ₆ H ₄) ₂	182.11	17.8	272	0.955 ¹⁰	
4759	C ₁₄ H ₁₄	<i>o</i> , <i>m'</i> -Ditolyl (CH ₂ C ₆ H ₄) ₂	182.11		287.5		
4760	C ₁₄ H ₁₄	<i>o</i> , <i>p'</i> -Ditolyl (CH ₂ C ₆ H ₄) ₂	182.11		281		
4761	C ₁₄ H ₁₄	<i>m</i> , <i>m'</i> -Ditolyl (CH ₂ C ₆ H ₄) ₂	182.11	7	288	0.999	
4762	C ₁₄ H ₁₄	<i>p</i> , <i>p'</i> -Ditolyl (CH ₂ C ₆ H ₄) ₂	182.11	121	295		
4763	C ₁₄ H ₁₄ N ₂	<i>o</i> , <i>o'</i> -Azotoluene (<i>o</i> -CH ₃ C ₆ H ₄ N) ₂	210.12	55			
4764	C ₁₄ H ₁₄ N ₂	<i>o'</i> , <i>p'</i> -Azotoluene.....	210.12	71			
4765	C ₁₄ H ₁₄ N ₂	<i>m</i> , <i>m'</i> -Azotoluene (<i>m</i> -CH ₃ C ₆ H ₄) ₂ N ₂ ...	210.12	55			
4766	C ₁₄ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Azotoluene (<i>p</i> -CH ₃ C ₆ H ₄) ₂ N ₂ ...	210.12	144			
4767	C ₁₄ H ₁₄ N ₂	<i>o</i> , <i>o'</i> -Diaminostilbene.....	210.12	170			
4768	C ₁₄ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Diaminostilbene.....	210.12	231			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4769	C ₁₄ H ₁₄ N ₂ O	Agathin <i>o</i> -OHC ₆ H ₄ CH:N.N(CH ₃)C ₆ H ₅ .	226.12	74			
4770	C ₁₄ H ₁₄ N ₂ O	<i>o</i> , <i>o'</i> -Azoxytoluene.....	226.12	59			
4771	C ₁₄ H ₁₄ N ₂ O	<i>m</i> , <i>m'</i> -Azoxytoluene.....	226.12	37			
4772	C ₁₄ H ₁₄ N ₂ O	<i>p</i> , <i>p'</i> -Azoxytoluene.....	226.12	70			
4773	C ₁₄ H ₁₄ N ₂ O ₂	<i>o</i> , <i>o'</i> -Azoanisol (<i>o</i> -CH ₃ OC ₆ H ₄) ₂ N ₂	242.12	164.0			
4774	C ₁₄ H ₁₄ N ₂ O ₂	<i>p</i> , <i>p'</i> -Azoxyanisol (<i>p</i> -CH ₃ OC ₆ H ₄) ₂ N ₂	258.12	117.4			
4775	C ₁₄ H ₁₄ N ₄	"Cyanaline".....	238.14	220			
4776	C ₁₄ H ₁₄ N ₄ O ₆	Theobromine salicylate.....	318.14				1333
4777	C ₁₄ H ₁₄ O	Benzyl ether (C ₆ H ₅ CH ₂) ₂ O.....	198.11		298	1.036 ¹⁶	
4778	C ₁₄ H ₁₄ O	<i>o</i> -Cresyl ether (CH ₃ C ₆ H ₄) ₂ O.....	198.11		278	1.047 ^{14,3}	
4779	C ₁₄ H ₁₄ O	<i>m</i> -Cresyl ether (CH ₃ C ₆ H ₄) ₂ O.....	198.11		288		
4780	C ₁₄ H ₁₄ O	<i>p</i> -Cresyl ether (<i>p</i> -CH ₃ C ₆ H ₄) ₂ O.....	198.11	50			
4781	C ₁₄ H ₁₄ O ₂	<i>dl</i> -Hydrobenzoin [C ₆ H ₅ CH(OH)] ₂	214.11	139	> 300		
4782	C ₁₄ H ₁₄ O ₂	Guaiacyl benzyl ether.....	214.11	62			
4783	C ₁₄ H ₁₄ O ₂	Isohydrobenzoin.....	214.11	121			
4784	C ₁₄ H ₁₄ O ₂ S	Dibenzylsulfone (C ₆ H ₅ CH ₂) ₂ SO ₂	246.17	150	290 s. d.		
4785	C ₁₄ H ₁₄ O ₂ S	<i>p</i> -Ditolylsulfone (CH ₃ C ₆ H ₄) ₂ SO ₂	246.17	158	405 ⁷¹⁴		
4786	C ₁₄ H ₁₄ S ₂	Dibenzyl disulfide (C ₆ H ₅ CH ₂) ₂ S ₂	246.24	72			
4787	C ₁₄ H ₁₄ S	Dibenzylsulfide (C ₆ H ₅ CH ₂) ₂ S.....	214.17	49		1.071 ⁵⁰	
4788	C ₁₄ H ₁₄ Se	Dibenzyl selenide (C ₆ H ₅ CH ₂) ₂ Se.....	261.31	45.5			
4789	C ₁₄ H ₁₄ N	Dibenzylamine (C ₆ H ₅ CH ₂) ₂ NH.....	197.12	-26.0	300	1.026 ^{21,6}	976
4790	C ₁₄ H ₁₄ N	<i>o</i> -Ditolylamine (<i>o</i> -CH ₃ C ₆ H ₄) ₂ NH.....	197.12		313.4		
4791	C ₁₄ H ₁₄ N	<i>m</i> -Ditolylamine (<i>m</i> -CH ₃ C ₆ H ₄) ₂ NH.....	197.12		320		
4792	C ₁₄ H ₁₄ N	<i>p</i> -Ditolylamine (<i>p</i> -CH ₃ C ₆ H ₄) ₂ NH.....	197.12	79	330.5		
4793	C ₁₄ H ₁₄ N	Ethylidiphenylamine (C ₆ H ₅) ₂ NC ₂ H ₅	197.12		297		
4794	C ₁₄ H ₁₄ N	<i>N</i> -Methylbenzylaniline.....	197.12	9.2	306		
4795	C ₁₄ H ₁₄ NO ₂ S	<i>p</i> -Toluenesulfonemethylanilide.....	261.19	95			
4796	C ₁₄ H ₁₄ N ₂	4-Amino-2, 4'-dimethylazobenzene.....	225.14	127			
4797	C ₁₄ H ₁₄ N ₂	4'-Amino-2, 3'-dimethylazobenzene.....	225.14	100			
4798	C ₁₄ H ₁₄ N ₂	4-Amino-2, 3'-dimethylazobenzene.....	225.14	80			
4799	C ₁₄ H ₁₄ N ₂	4-Amino-3, 4'-dimethylazobenzene.....	225.14	127			
4800	C ₁₄ H ₁₄ N ₂	<i>o</i> , <i>o'</i> -Diazoaminotoluene.....	225.14	51			
4801	C ₁₄ H ₁₄ N ₂	<i>p</i> , <i>p'</i> -Diazoaminotoluene.....	225.14	116			
4802	C ₁₄ H ₁₄	Hexahydroanthracene.....	184.12	63	290		
4803	C ₁₄ H ₁₄ N ₂	<i>o</i> -Hydrazotoluene (<i>o</i> -CH ₃ C ₆ H ₄ NH) ₂	212.14	165			
4805	C ₁₄ H ₁₄ N ₂	<i>p</i> -Hydrazotoluene (CH ₃ C ₆ H ₄ NH) ₂	212.14	126	d.	0.957	
4806	C ₁₄ H ₁₄ N ₂	<i>o</i> -Tolidine [4, 3-H ₂ N(CH ₃)C ₆ H ₃] ₂	212.14	129			
4807	C ₁₄ H ₁₄ N ₂	<i>m</i> -Tolidine [4, 2-H ₂ N(CH ₃)C ₆ H ₃] ₂	212.14	107			
4808	C ₁₄ H ₁₄ N ₂ O	3-Ethoxybenzidine.....	228.14	139			
4809	C ₁₄ H ₁₄ N ₂ O ₂	3, 3'-Dimethoxybenzidine.....	244.14	172			
4810	C ₁₄ H ₁₄ N ₄	2, 2'-Diamino-4, 4'-azotoluene.....	240.16	203			
4811	C ₁₄ H ₁₄ N ₄	3, 3'-Diamino-2, 2'-azotoluene.....	240.16	a, 145; b, 133; c, 159			
4812	C ₁₄ H ₁₄ N ₄ O ₆	Oscine picrate.....	384.16	238			
4813	C ₁₄ H ₁₇ N	Diethyl- α -naphthylamine.....	199.14		160.6 ¹⁸	1.005	937
4814	C ₁₄ H ₁₇ N	Diethyl- β -naphthylamine.....	199.14		192 ¹⁹	1.026	977
4815	C ₁₄ H ₁₇ NO	Etheserolene.....	215.14	48			
4816	C ₁₄ H ₁₇ NO ₆	Indican.....	295.14	57			
4817	C ₁₄ H ₁₇ NO ₆	<i>l</i> -Mandelonitrile glucoside.....	295.14	147			
4818	C ₁₄ H ₁₇ NO ₆	Prulaurasin.....	295.14	122			
4819	C ₁₄ H ₁₇ NO ₆	Sambunigrin.....	295.14	152			
4820	C ₁₄ H ₁₈ O ₂	Apocynamarin.....	234.14	175 d.			
4821	C ₁₄ H ₁₈ O ₇	Picein.....	298.14	194			
4822	C ₁₄ H ₂₀ N ₂ O ₆ S	Methylamino- <i>p</i> -phenol sulfate.....	344.24	260 d.			
4823	C ₁₄ H ₂₀ O ₂	Isanic acid.....	220.15	41			
4823.1	C ₁₄ H ₂₀ O ₂	<i>l</i> -Amyl hydrocinnamate.....	220.15		172 ²⁸	0.9721	
4824	C ₁₄ H ₂₀ O ₂	Helleboretin.....	236.15	> 200			
4825	C ₁₄ H ₂₁ ClN ₂ O ₄	Nirvanin.....	316.64	185			
4826	C ₁₄ H ₂₁ NO ₂	Thymacetone.....	235.17	136			
4827	C ₁₄ H ₂₂	1, 2, 3, 4-Tetraethylbenzene.....	190.17		254	0.887	637
4828	C ₁₄ H ₂₂	1, 2, 4, 5-Tetraethylbenzene.....	190.17	13	250	0.888	609
4829	C ₁₄ H ₂₁ ClNO ₂	Stovain.....	271.64	175			
4830	C ₁₄ H ₂₂ O ₂	Longifolic acid.....	222.17	153	234 ⁵⁵		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4831	C ₁₄ H ₂₂ O ₄	Dicyclohexyl oxalate.....	254.17	45	191 ¹³		
4831.1	C ₁₄ H ₂₃ ClO ₄	Di- <i>l</i> -amyl chlorofumarate.....	290.65		185 ¹³	1.052 ²⁸	
4832	C ₁₄ H ₂₃ N	<i>N</i> -Dibutylaniline C ₈ H ₉ N(C ₄ H ₉) ₂	205.19		262.8		
4832.1	C ₁₄ H ₂₃ N	Diisobutylaniline.....	205.19		146 ²¹	0.909 ²⁶	
4833	C ₁₄ H ₂₄ O ₂	Kersyl alcohol.....	224.19	85	156 ¹¹		
4834	C ₁₄ H ₂₄ O ₂	<i>d</i> -Bornyl <i>n</i> -butyrate.....	224.19		121 ¹¹	0.966 ¹⁶	856
4835	C ₁₄ H ₂₄ O ₂	Geranyl butyrate.....	224.19		153 ¹³	0.901	
4836	C ₁₄ H ₂₄ O ₂	<i>l</i> -Menthyl crotonate.....	224.19		140.5 ¹⁴	0.833	
4837	C ₁₄ H ₂₄ O ₂	<i>l</i> -Menthyl acetoacetate.....	240.19	45	145 ¹¹	0.986 ¹⁵	
4837.1	C ₁₄ H ₂₄ O ₄	Di- <i>l</i> -amyl maleate.....	256.19		165 ²⁶	0.9708 ²⁸	
4838	C ₁₄ H ₂₄ O ₄	<i>l</i> -Menthyl acid succinate.....	256.19	62	300 d.		
4839	C ₁₄ H ₂₄ NO ₂	Carpaine.....	239.20	121			1333
4840	C ₁₄ H ₂₄ ClNO ₂	Carpaine hydrochloride.....	275.67	225			
4841	C ₁₄ H ₂₆ O ₂	<i>l</i> -Menthyl <i>n</i> -butyrate.....	226.20		129 ¹⁵	0.911	
4842	C ₁₄ H ₂₆ O ₂	<i>l</i> -Menthyl isobutyrate.....	226.20		117 ¹³	0.906	
4843	C ₁₄ H ₂₆ O ₂	<i>n</i> -Heptylic anhydride (C ₈ H ₁₅ CO) ₂ O.....	242.20	17	258	0.932	332
4844	C ₁₄ H ₂₆ O ₃	Menthyl ethyl glycollate.....	242.20		155 ²⁰		
4845	C ₁₄ H ₂₆ O ₄	Diamyl succinate.....	258.20		293	0.952 ²⁵	
4845.1	C ₁₄ H ₂₆ O ₄	Di- <i>l</i> -amyl succinate.....	258.20		129 ¹	0.957 ²⁶	
4846	C ₁₄ H ₂₆ O ₄	Diethyl sebacate.....	258.20	1	308	0.965 ¹⁶	
4846.1	C ₁₄ H ₂₆ O ₆	Diisoamyl tartrate.....	290.20		195 ¹⁶	1.063 ¹⁶	
4847	C ₁₄ H ₂₇ ClO	Myristyl chloride CH ₃ (CH ₂) ₁₂ COCl.....	246.67	-1	168 ¹⁵		
4848	C ₁₄ H ₂₇ N	Myristic nitrile CH ₃ (CH ₂) ₁₂ CN.....	209.22	19	226 ¹⁰⁰	0.828	
4849	C ₁₄ H ₂₈	<i>n</i> -Tetradecylene.....	196.22	-12	246	0.775	
4850	C ₁₄ H ₂₈ O	Myristic aldehyde CH ₃ (CH ₂) ₁₂ CHO.....	212.22	52.5	166 ²⁴		
4851	C ₁₄ H ₂₈ O ₂	Myristic acid CH ₃ (CH ₂) ₁₂ CO ₂ H.....	228.22	58	250.5 ¹⁰⁰	0.858 ⁹⁰	1088
4852	C ₁₄ H ₂₈ O ₂	Ethyl laurate C ₁₁ H ₂₃ CO ₂ C ₂ H ₅	228.22	-10.7	269	0.868 ¹³	337
4853	C ₁₄ H ₂₈ O ₃	Hydroxymyristic acid.....	244.22	51			
4854	C ₁₄ H ₂₈ O ₄	Ipurolic acid.....	260.22	101			
4855	C ₁₄ H ₂₈ NO	Myristic amide CH ₃ (CH ₂) ₁₂ CONH ₂	227.23	103			
4856	C ₁₄ H ₃₀	<i>n</i> -Tetradecane CH ₃ (CH ₂) ₁₂ CH ₃	198.23	5.5	252.5	0.765	412
4857	C ₁₄ H ₃₀ O	<i>n</i> -Heptyl ether (C ₇ H ₁₅) ₂ O.....	214.23		260	0.815 ⁹	
4858	C ₁₄ H ₃₀ O	<i>n</i> -Tetradecyl alcohol C ₁₃ H ₂₇ CH ₂ OH.....	214.23	38	167 ¹⁵	0.824 ²³	
4859	C ₁₄ H ₃₁ N	Tetradecyl amine C ₁₃ H ₂₇ CH ₂ NH ₂	213.25	37	162 ¹⁵		
4860	C ₁₄ H ₈ O ₄	Anthraquinone- α -carboxylic acid.....	252.06	294			
4861	C ₁₄ H ₈ O ₄	Anthraquinone- β -carboxylic acid.....	252.06	288			
4862	C ₁₄ H ₈ O ₄	Anthraquinone- γ -carboxylic acid.....	252.06	285			
4863	C ₁₄ H ₈ O ₆	Alizarin- β -carboxylic acid.....	284.06	305			
4864	C ₁₄ H ₈ O ₇	Pseudopurpurin.....	300.06	220			
4865	C ₁₄ H ₈ N	Thebenidine.....	203.08	148			
4866	C ₁₄ H ₁₀	Fluoranthene.....	190.08	110	251 ⁶⁰		
4867	C ₁₄ H ₁₀	Succisterene.....	190.08	160	300		
4868	C ₁₄ H ₁₀ O ₂	Flavone.....	222.08	97			
4869	C ₁₄ H ₁₀ O ₂	Anthracene-1-carboxylic acid.....	222.08	260			
4870	C ₁₄ H ₁₀ O ₂	Anthracene-2-carboxylic acid.....	222.08	280			
4871	C ₁₄ H ₁₀ O ₂	Anthracene-9-carboxylic acid.....	222.08	206			
4872	C ₁₄ H ₁₀ O ₂	1-Methylanthraquinone.....	222.08	171			
4873	C ₁₄ H ₁₀ O ₂	2-Methylanthraquinone.....	222.08	175			
4874	C ₁₄ H ₁₀ O ₄	Chrysine.....	254.08	275			
4875	C ₁₄ H ₁₀ O ₄	Chrysophanic acid.....	254.08	193			
4876	C ₁₄ H ₁₀ O ₄	α -Methylalizarin.....	254.08	229			
4877	C ₁₄ H ₁₀ O ₄	β -Methylalizarin.....	254.08	179			
4878	C ₁₄ H ₁₀ O ₄	Rumicin.....	254.08	182			
4879	C ₁₄ H ₁₀ O ₅	Aloe-emodin.....	270.08	218			
4880	C ₁₄ H ₁₀ O ₅	Emodin.....	270.08	250			
4881	C ₁₄ H ₁₀ O ₅	Galangin.....	270.08	217			
4882	C ₁₄ H ₁₀ O ₅	Morindon.....	270.08	275			
4883	C ₁₄ H ₁₀ O ₆	Fisetin.....	286.08	360			
4884	C ₁₄ H ₁₀ O ₆	Kaempferol.....	286.08	274			
4885	C ₁₄ H ₁₀ O ₆	Luteolin.....	286.08	320			
4886	C ₁₄ H ₁₀ O ₆	Rhein.....	286.08	314			
4887	C ₁₄ H ₁₀ O ₆	Scutellarein.....	286.08	300 d.			
4888	C ₁₄ H ₁₀ O ₇	Morin.....	302.08	285			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4889	C ₁₈ H ₁₀ O ₇	Quercetin.....	302.08	310			
4890	C ₁₈ H ₁₀ O ₈	Gossypetin.....	318.08	230			
4891	C ₁₈ H ₁₀ O ₈	Quercetagenin.....	318.08	318			
4892	C ₁₈ H ₁₁ N	2-Phenylquinoline.....	205.09	86	363		
4893	C ₁₈ H ₁₁ N	4-Phenylquinoline.....	205.09	62			
4894	C ₁₈ H ₁₁ N	6-Phenylquinoline.....	205.09	111	260 ⁷⁷	1.195	
4895	C ₁₈ H ₁₁ N	8-Phenylquinoline.....	205.09		283 ¹⁸⁷		
4896	C ₁₈ H ₁₁ NO	Benzoylphenylacetoneitrile.....	221.09	99			
4897	C ₁₈ H ₁₂	α-Methylanthracene.....	192.09	86	200	1.047 ^{99,4}	1134
4898	C ₁₈ H ₁₂	2-Methylanthracene.....	192.09	207			
4899	C ₁₈ H ₁₂	9-Methylanthracene.....	192.09	80		1.066 ^{99,4}	1136
4900	C ₁₈ H ₁₂ N ₂ O ₂	Furfuramide.....	268.11	121	250 d.		
4901	C ₁₈ H ₁₂ N ₂ O ₂	Furfurine.....	268.11	116			
4902	C ₁₈ H ₁₂ O	Benzylideneacetophenone.....	208.09	62	348	1.071 ⁴²	
4903	C ₁₈ H ₁₂ O ₂	Benzoylacetophenone.....	224.09	81	>200		
4904	C ₁₈ H ₁₂ O ₂	<i>p</i> -Toluylo- <i>o</i> -benzoic acid.....	240.09	139			
4905	C ₁₈ H ₁₂ O ₂	Chrysophanol.....	240.09	204			
4906	C ₁₈ H ₁₂ O ₄	Acetylsalol <i>o</i> -CH ₃ CO ₂ C ₆ H ₄ CO ₂ C ₆ H ₅	256.09	97	198		
4907	C ₁₈ H ₁₂ O ₄	Benzosalin.....	256.09	85	385		
4908	C ₁₈ H ₁₂ O ₄	Diphenyl malonate CH ₃ (CO ₂ C ₆ H ₅) ₂	256.09	50	210 ¹⁸ d.		
4909	C ₁₈ H ₁₂ O ₆	Eriodictyol.....	288.09	267			
4910	C ₁₈ H ₁₂ O ₆	Methylenedisalicylic acid.....	288.09	238 d.			
4911	C ₁₈ H ₁₂ NO ₄	Salophen.....	271.11	188			
4912	C ₁₈ H ₁₄ O	Benzylacetophenone.....	210.11	73	360		
4913	C ₁₈ H ₁₄ O	Benzyl <i>p</i> -tolyl ketone.....	210.11	109	360		
4914	C ₁₈ H ₁₄ O	Dibenzyl ketone (C ₆ H ₅ CH ₂) ₂ CO.....	210.11	33.9	330.5		
4915	C ₁₈ H ₁₄ O	<i>p</i> , <i>p</i> '-Dimethylbenzophenone.....	210.11	92	335.1		
4916	C ₁₈ H ₁₄ O ₂	Benzyl <i>o</i> -toluate.....	226.11		315	1.12 ¹⁷	
4917	C ₁₈ H ₁₄ O ₂	Benzyl phenylacetate.....	226.11		319	1.101	
4918	C ₁₈ H ₁₄ O ₂	Benzyl mandelate.....	242.11	93			
4919	C ₁₈ H ₁₄ O ₂	Methyl benzilate.....	242.11	73			
4920	C ₁₈ H ₁₄ O ₂	Lapachol.....	242.11	140			
4921	C ₁₈ H ₁₄ O ₄	Hydrocotoin.....	258.11	95.5			
4922	C ₁₈ H ₁₄ O ₄	Peucedanin.....	258.11	109			
4923	C ₁₈ H ₁₄ O ₄	<i>N</i> -Xanthoxyllin.....	258.11	132.5			
4924	C ₁₈ H ₁₄ O ₅	Guaiacyl carbonate (<i>o</i> -CH ₃ OC ₆ H ₄ O) ₂ CO.....	274.11	86			
4925	C ₁₈ H ₁₄ O ₅	Kavaïin (Methysticin).....	274.11	137			
4926	C ₁₈ H ₁₄ O ₅	Phloretin.....	274.11	255 d.			1333
4927	C ₁₈ H ₁₄ NO	<i>p</i> -Dimethylaminobenzophenone.....	225.12	90			
4928	C ₁₈ H ₁₄ NO ₂	Malakin.....	257.12	92			
4929	C ₁₈ H ₁₄ NO ₂	Narceinic acid.....	337.12	184			
4930	C ₁₈ H ₁₆	Dibenzylmethane (C ₆ H ₅ CH ₂) ₂ CH ₂	196.12	< -20	299	1.007	762
4931	C ₁₈ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>o</i> -tolylurea.....	240.14	256			
4932	C ₁₈ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>m</i> -tolylurea.....	240.14	203			
4933	C ₁₈ H ₁₆ N ₂ O	<i>sym</i> .-Di- <i>p</i> -tolylurea.....	240.14	263			
4934	C ₁₈ H ₁₆ N ₂ S	1, 2-Di- <i>o</i> -tolylthiourea.....	256.20	156	218		
4935	C ₁₈ H ₁₆ N ₂ S	<i>sym</i> .-Di- <i>m</i> -tolylthiourea.....	256.20	111.5			
4936	C ₁₈ H ₁₆ O ₂	Santinic acid.....	228.12	132.5			
4936.1	C ₁₈ H ₁₆ O ₂	Picrotoxinin.....	292.12	206			1265
4937	C ₁₈ H ₁₆ O ₂	Daphnin.....	340.12	200			
4938	C ₁₈ H ₁₆ O ₂	Esculin.....	340.12	205			
4939	C ₁₈ H ₁₇ N	Ethylbenzylaniline.....	211.14		298	1.034 ^{18,5}	
4940	C ₁₈ H ₁₇ N ₂	Di- <i>o</i> -tolylguanidine.....	239.16	179			
4941	C ₁₈ H ₁₈	Azulene.....	198.14		168.4 ¹¹	0.988	
4942	C ₁₈ H ₁₈ N ₂	<i>p</i> , <i>p</i> '-Diamino- <i>o</i> , <i>o</i> '-ditolylmethane.....	226.16	149			
4943	C ₁₈ H ₁₈ O ₂	Santonin.....	246.14	170		1.187	1282
4944	C ₁₈ H ₁₈ O ₄	Artemisin.....	262.14	202			1333
4944.1	C ₁₈ H ₁₈ O ₄	Coriamyrtin.....	262.14	225			
4945	C ₁₈ H ₁₈ O ₇	Hyenanchin.....	310.14	234 d.			
4946	C ₁₈ H ₁₈ O ₇	Picrotin.....	310.14	250			
4947	C ₁₈ H ₁₉ NO ₂	Tropacocaine.....	245.15	49	d.	1.043 ¹⁰⁰	1147
4948	C ₁₈ H ₁₉ NO ₂	Lithuric acid.....	357.15	204.5			
4949	C ₁₈ H ₂₀ ClNO ₂	Tropacocaine hydrochloride.....	281.62	271			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
4950	C ₁₅ H ₂₀ O ₂	Alantolactone.....	232.15	76	192 ¹⁰		
4951	C ₁₅ H ₂₀ O ₂	Perezone.....	248.15	105			
4952	C ₁₅ H ₂₀ O ₂	Pipitzol.....	248.15	141			
4953	C ₁₅ H ₂₀ O ₄	Absinthiin.....	264.15	68			
4954	C ₁₅ H ₂₀ O ₄	Isosantonin acid.....	264.15	155	160 ⁴		
4955	C ₁₅ H ₂₀ O ₄	<i>dl</i> -Santonin acid.....	264.15	120 d.			
4956	C ₁₅ H ₂₀ O ₄	<i>d(l)</i> -Santonin acid.....	264.15	179	260 ⁴	1.251	1333
4957	C ₁₅ H ₂₀ O ₃	Androsin.....	328.15	220			
4958	C ₁₅ H ₂₁ NO ₂	β -Eucaine.....	247.17	91			
4959	C ₁₅ H ₂₁ NO ₄	Ajacine.....	279.17	143			
4960	C ₁₅ H ₂₁ N ₂ O ₂	Physostigmine.....	275.19	105			1263
4961	C ₁₅ H ₂₁ N ₂ O ₂	Geneserine.....	291.19	129			
4962	C ₁₅ H ₂₃ BrN ₂ O ₂	Physostigmine hydrobromide.....	356.11				1333
4963	C ₁₅ H ₂₃ ClNO ₂	β -Eucaine hydrochloride.....	283.64	268			
4964	C ₁₅ H ₂₃ ClNO ₄	Ajacine hydrochloride.....	315.64	93			
4965	C ₁₅ H ₂₃ ClN ₂ O ₂	Physostigmine hydrochloride.....	311.65				1333
4966	C ₁₅ H ₂₂ O ₂	Santalal acid.....	234.17		195 ⁹		
4967	C ₁₅ H ₂₂ O ₂	Eugenol isoamyl ether.....	234.17		302.2 d.	0.976	846
4968	C ₁₅ H ₂₂ O ₂	Thymyl isovalerate.....	234.17		249	0.959 ¹⁵	
4969	C ₁₅ H ₂₂ O ₃	Alantic (Alantolic) acid.....	250.17	94			
4970	C ₁₅ H ₂₃ Cl	Santalyl chloride.....	238.64		155 ¹⁰	1.040	
4971	C ₁₅ H ₂₄	Atractylene.....	204.19		141 ^{14,5}	0.927	625
4972	C ₁₅ H ₂₄	<i>l</i> -Cadinene.....	204.19		275	0.918	631
4973	C ₁₅ H ₂₄	Cannibene.....	204.19		259	0.897 ¹⁵	
4974	C ₁₅ H ₂₄	α -Caryophyllene.....	204.19		260	0.906	596
4975	C ₁₅ H ₂₄	Cedrene.....	204.19		264	0.929	590
4976	C ₁₅ H ₂₄	Clovene.....	204.19		263	0.930	603
4977	C ₁₅ H ₂₄	Guajene.....	204.19		124 ⁹	0.908	602
4978	C ₁₅ H ₂₄	Patschoulene.....	204.19		256	0.930	591
4979	C ₁₅ H ₂₄	α -Santalene.....	204.19		252	0.913 ¹⁵	862
4980	C ₁₅ H ₂₄	β -Santalene.....	204.19		126 ⁷	0.894	569
4981	C ₁₅ H ₂₄	γ -Santalene.....	204.19		120 ¹⁰	0.936	617
4982	C ₁₅ H ₂₄	α -Selinene.....	204.19		135 ¹⁶	0.914	
4983	C ₁₅ H ₂₄	Zingiberene.....	204.19		270	0.872 ¹⁵	574
4984	C ₁₅ H ₂₄ N ₂ O	<i>d(l)</i> -Lupanine.....	248.20	44			
4985	C ₁₅ H ₂₄ N ₂ O	Oxysparteine.....	248.20	84	209 ^{12,5}		
4986	C ₁₅ H ₂₄ O	Betulol.....	220.19		158 ¹³	0.978 ¹⁶	865
4987	C ₁₅ H ₂₄ O	α -Santalol.....	220.19		300	0.979 ¹⁵	957
4988	C ₁₅ H ₂₄ O	β -Santalol.....	220.19		309	0.973 ¹⁵	958
4989	C ₁₅ H ₂₅ BrO ₂	Bornyl bromoisovalerate.....	317.11		163 ¹⁰		
4990	C ₁₅ H ₂₅ NO ₇	Senecifolidine.....	331.20	212			
4991	C ₁₅ H ₂₆	Elemone.....	206.20		119 ¹⁰	0.883	
4992	C ₁₅ H ₂₆	Ferulene.....	206.20		126 ⁷	0.870	
4993	C ₁₅ H ₂₆ N ₂	Isosparteine.....	234.22		179 ^{14,5}	1.028 ¹⁷	916
4994	C ₁₅ H ₂₆ N ₂	Sparteine.....	234.22		325.2	1.023	959
4995	C ₁₅ H ₂₆ N ₂ O	Retamine.....	250.22	162			
4996	C ₁₅ H ₂₆ O	Atractylol.....	222.20	59	292	1.511	
4997	C ₁₅ H ₂₆ O	Cedrol.....	222.20	87	294		
4998	C ₁₅ H ₂₆ O	α -Elemol.....	222.20	46	143 ¹⁰	0.941 ^{21,3}	967
4999	C ₁₅ H ₂₆ O	β -Elemol.....	222.20		144 ¹⁰	0.942 ¹³	611
5000	C ₁₅ H ₂₆ O	Eudesmol.....	222.20	78	156 ¹⁰	0.988	657
5001	C ₁₅ H ₂₆ O	Farnesol.....	222.20		120 ^{9,3}	0.895	548
5002	C ₁₅ H ₂₆ O	Guajol.....	222.20	93	289 s. d.		1175
5003	C ₁₅ H ₂₆ O	Nerolidol.....	222.20		277	0.880	891
5004	C ₁₅ H ₂₆ O	Zingiberol.....	222.20		157 ^{14,5}		
5005	C ₁₅ H ₂₆ O ₂	Bornyl isovalerate.....	238.20		260	0.949	985
5006	C ₁₅ H ₂₆ O ₂	Isobornyl isovalerate.....	238.20		138 ¹³	0.957 ¹⁵	
5007	C ₁₅ H ₂₆ O ₂	<i>d</i> -Bornyl <i>n</i> -valerate.....	238.20		130 ¹¹	0.956 ¹⁵	855
5008	C ₁₅ H ₂₆ O ₂	<i>l</i> -Menthyl angelate.....	238.20		141 ¹⁰		
5009	C ₁₅ H ₂₆ O ₂	<i>l</i> -Menthyl levulinate.....	254.20		169 ¹²	0.977	
5010	C ₁₅ H ₂₆ O ₄	Tributyrin.....	302.20	< -75	310	1.027	351
5011	C ₁₅ H ₂₇ ClN ₂	Sparteine hydrochloride.....	270.68				1333
5012	C ₁₅ H ₂₇ IN ₂	Sparteine hydroiodide.....	362.16				1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5013	C ₁₅ H ₂₈ O ₂	<i>l</i> -Menthyl isovalerate.....	240.22		127 ¹¹	0.907 ¹⁵	427
5014	C ₁₅ H ₂₈ O ₂	Camphic acid.....	240.22	44.2			
5015	C ₁₅ H ₂₈ O ₂	<i>l</i> -Menthyl <i>n</i> -valerate.....	240.22		141 ¹⁵	0.907	
5016	C ₁₅ H ₃₀ O ₂	Pentadecylic acid.....	242.23	54	257 ¹⁰⁰		
5017	C ₁₅ H ₃₀ O ₂	Methyl myristate.....	242.23	19	295.3		
5018	C ₁₅ H ₃₂	<i>n</i> -Pentadecane CH ₃ (CH ₂) ₁₃ CH ₃	212.25	10	270.5	0.772	
5019	C ₁₅ H ₃₂ O	<i>n</i> -Pentadecyl alcohol CH ₃ (CH ₂) ₁₄ OH.....	228.25	46			
5020	C ₁₅ H ₃₃ N	Pentadecylamine.....	227.26	36.5	301		
5021	C ₁₅ H ₃₃ N	Triisoamylamine.....	227.26		237	0.785 ¹⁵	
5022	C ₁₅ H ₈ O ₆	Anthraquinone-1, 3-dicarboxylic acid.....	296.06	330			
5023	C ₁₅ H ₈ O ₆	Anthraquinone-1, 4-dicarboxylic acid.....	296.06	300			
5024	C ₁₅ H ₈ O ₆	Anthraquinone-2, 3-dicarboxylic acid.....	296.06	340			
5025	C ₁₅ H ₁₀	Diphenyldiacetylene.....	202.08	88			
5026	C ₁₅ H ₁₀	Pyrene.....	202.08	150	>360		
5027	C ₁₅ H ₁₀ N ₂	α , β -Naphthophenazine.....	230.09	142.5	>360		
5028	C ₁₅ H ₁₀ N ₂ O ₂	Indigotin.....	262.09	392 d.		1.35	
5028.1	C ₁₅ H ₁₀ O ₄	Diphenylmaleic anhydride.....	250.08	155		1.340	1211
5029	C ₁₅ H ₁₀ O ₄	Anthracene-1, 3-dicarboxylic acid.....	266.08	330			
5030	C ₁₅ H ₁₀ O ₄	Anthracene-1, 4-dicarboxylic acid.....	266.08	320			
5031	C ₁₅ H ₁₀ O ₄	Anthracene-2, 3-dicarboxylic acid.....	266.08	345			
5032	C ₁₅ H ₁₀ O ₆	Trifolitin.....	298.08	275			
5033	C ₁₅ H ₁₁ N	Amaron.....	217.09	240			
5034	C ₁₅ H ₁₁ N	Aminopyrene.....	217.09	116			
5035	C ₁₅ H ₁₁ NO ₂	Atophan (2-Phenylquinoline-4-carboxylic acid).....	249.09	209			
5036	C ₁₅ H ₁₁ N ₂ O ₂	Indigoxime.....	277.11	205			
5037	C ₁₅ H ₁₃	α -Phenylnaphthalene.....	204.09		325		
5038	C ₁₅ H ₁₃	β -Phenylnaphthalene.....	204.09	102.5	345		
5039	C ₁₅ H ₁₃	Pseudophenanthrene.....	204.09	115			
5040	C ₁₅ H ₁₃ ClNO ₂	Chloroxyl (Phenylcinchoninic acid hydrochloride).....	285.56	223			
5041	C ₁₅ H ₁₃ N ₂ O ₂	Isatid.....	296.11	237.5			
5042	C ₁₅ H ₁₃ N ₄ O	Azoxytolunitrile.....	276.12	182			
5043	C ₁₅ H ₁₃ O	Phenyl α -naphthyl ether.....	220.09	55	340		
5044	C ₁₅ H ₁₃ O	Phenyl β -naphthyl ether.....	220.09	45; 93	335.8		
5045	C ₁₅ H ₁₃ O ₈ S	Atronylenesulfonic acid.....	284.16	258			
5046	C ₁₅ H ₁₃ O ₄	α -Ethylalizarin.....	268.09	189			
5047	C ₁₅ H ₁₃ O ₄	Pratol.....	268.09	253			
5048	C ₁₅ H ₁₃ O ₆	Physcion (Physic acid).....	284.09	207			
5049	C ₁₅ H ₁₃ O ₆	Chrysoeriol.....	300.09	>337			
5050	C ₁₅ H ₁₃ O ₆	Emodine methyl ether.....	300.09	195			
5051	C ₁₅ H ₁₃ O ₆	Hematein.....	300.09	250 d.			
5052	C ₁₅ H ₁₃ O ₆	Laccainic acid.....	332.09		180 d.		
5053	C ₁₅ H ₁₃ N	Flavoline.....	219.11	65	375		
5054	C ₁₅ H ₁₃ N	<i>N</i> -Phenyl- α -naphthylamine.....	219.11	62	335 ¹⁰⁰		
5055	C ₁₅ H ₁₃ N	<i>N</i> -Phenyl- β -naphthylamine.....	219.11	108	399.5		
5056	C ₁₅ H ₁₃ NO ₇	Papaveric acid.....	331.11	233 d.			
5057	C ₁₅ H ₁₃ N ₃	Galegine.....	233.12	65			
5058	C ₁₅ H ₁₃ N ₃	Hydrazoindole.....	247.12	140			
5059	C ₁₅ H ₁₄	Atronene.....	206.11		326		
5060	C ₁₅ H ₁₄	2, 3-Dimethylantracene.....	206.11	246			
5061	C ₁₅ H ₁₄	2, 4-Dimethylantracene.....	206.11	71			
5062	C ₁₅ H ₁₄	2, 6-Dimethylantracene.....	206.11	231			
5062.1	C ₁₅ H ₁₄	Distyrene C ₆ H ₅ CH:CHCH:CHC ₆ H ₅	206.11	124			
5063	C ₁₅ H ₁₄	9-Ethylantracene.....	206.11	59		1.041 ^{100,2}	1130
5064	C ₁₅ H ₁₄ Cl ₂ N ₂ O ₂	3, 3'-Dichlorodiacetylbenzidine.....	337.04	302			
5065	C ₁₅ H ₁₄ N ₂	α -Flavaniline.....	234.12	97			
5066	C ₁₅ H ₁₄ N ₂	Indolin.....	234.12		245		
5066.1	C ₁₅ H ₁₄ N ₂	1, 5-Diphenyl-3-methylpyrazole.....	234.12	63			1199
5067	C ₁₅ H ₁₄ O	Dypnone.....	222.11		225 ¹⁰		
5067.1	C ₁₅ H ₁₄ O	Benzylidene- <i>p</i> -tolyl ketone.....	222.11	77			1289
5068	C ₁₅ H ₁₄ O ₂	Benzyl cinnamate.....	238.11	34	244 ¹⁰		
5069	C ₁₅ H ₁₄ O ₂	Diphenacyl C ₆ H ₅ COCH ₂ CH ₂ COC ₆ H ₅	238.11	145			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5070	C ₁₅ H ₁₄ O ₂	Guaiacyl cinnamate.....	254.11	130			
5071	C ₁₅ H ₁₄ O ₂	Phenylacetic anhydride.....	254.11	117.5			
5072	C ₁₅ H ₁₄ O ₂	<i>o</i> -Toluic anhydride (<i>o</i> -CH ₃ C ₆ H ₄ CO) ₂ O..	254.11	39	325		
5073	C ₁₅ H ₁₄ O ₄	Dibenzyl oxalate (CO ₂ CH ₂ C ₆ H ₅) ₂	270.11	81	235 ¹⁴		
5074	C ₁₅ H ₁₄ O ₄	Diphenyl succinate (CH ₃ CO ₂ C ₆ H ₅) ₂	270.11	121	330		
5075	C ₁₅ H ₁₄ O ₅	Brasilin.....	286.11	250			
5076	C ₁₅ H ₁₄ O ₅	Sakuranetin.....	286.11	150			
5077	C ₁₅ H ₁₄ O ₅	Diphenyl tartrate (CHOHCO ₂ C ₆ H ₅) ₂ ..	302.11	102			
5078	C ₁₅ H ₁₄ O ₅	Hematoxylin.....	302.11	140			1333
5079	C ₁₅ H ₁₄ O ₅	Hesperetin.....	302.11	226			
5080	C ₁₅ H ₁₄ O ₅	Homoeriodictiol.....	302.11	223			
5081	C ₁₅ H ₁₅ NO ₂	Anisaldazine.....	254.12	169	180	1.031 ¹⁵	
5082	C ₁₅ H ₁₅ N ₂ O ₂	Diacetylbenzidine (<i>p</i> -CH ₃ CONHC ₆ H ₄) ₂	268.14	331			
5082.1	C ₁₅ H ₁₅ N ₂ O ₂	<i>o</i> -Aminophenyl tartrate.....	332.14	211 d.			
5082.2	C ₁₅ H ₁₅ N ₂ O ₂	<i>m</i> -Aminophenyl tartrate.....	332.14	175 d.			
5082.3	C ₁₅ H ₁₅ N ₂ O ₂	<i>p</i> -Aminophenyl tartrate.....	332.14	220 d.			
5082.4	C ₁₅ H ₁₅ N ₂ O ₂	Diacetylhydrazobenzene.....	268.15	105			1293
5083	C ₁₅ H ₁₅ N ₂ S	Dehydrothioxylidine.....	268.20		197		
5084	C ₁₅ H ₁₅ N ₂ O ₁₀	Damascenine picrate.....	424.16	159			
5085	C ₁₅ H ₁₅ O ₂	<i>p</i> -Dimethylbenzoin.....	240.12	89			
5086	C ₁₅ H ₁₅ O ₂	Anisilic acid.....	288.12	164			
5087	C ₁₅ H ₁₅ O ₂	Ethyl benzilate.....	256.12	34	201 ²¹		
5088	C ₁₅ H ₁₇ NO ₂	Amygdophenine.....	271.14	141			
5089	C ₁₅ H ₁₇ NO ₄	Lycorine.....	287.14	235 d.			
5090	C ₁₅ H ₁₇ NO ₄	Phenetidine salicylacetate.....	287.14	182			
5091	C ₁₅ H ₁₈ ClNO ₄	Lycorine hydrochloride.....	323.61	208			
5092	C ₁₅ H ₁₈ N ₂	Azo- <i>o</i> -ethylbenzene.....	238.16	46.5			
5093	C ₁₅ H ₁₈ N ₂	Azo- <i>p</i> -ethylbenzene.....	238.16	63	>340		
5094	C ₁₅ H ₁₈ N ₂	3, 3'-Azo- <i>o</i> -xylene.....	238.16	111			
5095	C ₁₅ H ₁₈ N ₂	4, 4'-Azo- <i>o</i> -xylene.....	238.16	141			
5096	C ₁₅ H ₁₈ N ₂	4, 4'-Azo- <i>m</i> -xylene.....	238.16	129			
5097	C ₁₅ H ₁₈ N ₂	4, 5'-Azo- <i>m</i> -xylene.....	238.16	47			
5098	C ₁₅ H ₁₈ N ₂	5, 5'-Azo- <i>m</i> -xylene.....	238.16	137			
5099	C ₁₅ H ₁₈ N ₂	2, 2'-Azo- <i>p</i> -xylene.....	238.16	119			
5100	C ₁₅ H ₁₈ N ₂	Diphenylpiperazine.....	238.16	163.5	242 ²⁰		
5101	C ₁₅ H ₁₈ N ₂ O	Paricine.....	254.16	130			
5102	C ₁₅ H ₁₈ N ₂ O ₂	<i>o</i> -Azophenetol (C ₂ H ₅ OC ₆ H ₄ N) ₂	270.16	131	240		
5103	C ₁₅ H ₁₈ N ₂ O ₂	<i>p</i> -Azophenetol (C ₂ H ₅ OC ₆ H ₄ N) ₂	270.16	160.2			
5104	C ₁₅ H ₁₈ N ₂ O ₂	3, 3'-Azoxy-4-methoxytoluene.....	286.16	149			
5105	C ₁₅ H ₁₈ N ₂ O ₂	<i>p</i> -Azoxyphenetol.....	286.16	136.9			
5106	(C ₁₅ H ₁₈ N ₂ O ₂) _x	Bilirubin.....	[286.16] _x	192.5			
5107	C ₁₅ H ₁₈ N ₂ O ₂	Carpiline.....	286.16	185			
5108	C ₁₅ H ₁₈ N ₂ O ₂	Hematoporphyrin.....	286.16	<100 d.			
5109	C ₁₅ H ₁₈ N ₂ O ₂	Pilosine.....	286.16	187			
5110	C ₁₅ H ₁₈ O	Thymyl phenyl ether.....	226.14		296.8	1.011	
5111	C ₁₅ H ₁₈ O ₂ S	Di- <i>m</i> -xylylsulfone.....	274.20	121			
5112	C ₁₅ H ₁₈ O ₇	Barbaloin.....	322.14	148			
5113	C ₁₅ H ₁₉ NO ₄	Benzoyllecgonine.....	289.15	195			
5114	C ₁₅ H ₂₀ N ₂	3-Hydrazo- <i>o</i> -xylene.....	240.17	141			
5115	C ₁₅ H ₂₀ N ₂	4-Hydrazo- <i>o</i> -xylene.....	240.17	107			
5116	C ₁₅ H ₂₀ N ₂	4-Hydrazo- <i>m</i> -xylene.....	240.17	122			
5117	C ₁₅ H ₂₀ N ₂	5-Hydrazo- <i>m</i> -xylene.....	240.17	125			
5118	C ₁₅ H ₂₀ N ₂	2-Hydrazo- <i>p</i> -xylene.....	240.17	145			
5119	C ₁₅ H ₂₀ N ₂ O ₂	<i>o</i> -Hydrazophenetol (<i>o</i> -C ₂ H ₅ OC ₆ H ₄ NH) ₂	272.17	89			
5123	C ₁₅ H ₂₀ N ₄	<i>m</i> -Tetramethyldiaminoazobenzene.....	268.19	118			
5124	C ₁₅ H ₂₀ O ₄	Phenyl acid camphorate.....	276.15	100			
5125	C ₁₅ H ₂₀ O ₉	Gentiopicroin.....	356.15	191			
5126	C ₁₅ H ₂₁ N ₃	<i>p</i> -(Tetramethyldiamino)diphenylamine....	255.19	119			
5127	C ₁₅ H ₂₁ NO ₂	Camphoranilic acid.....	275.17	204			
5128	C ₁₅ H ₂₁ NO ₂	Homoatropine.....	275.17	97.5			1333
5129	C ₁₅ H ₂₁ NO ₂	Noratropine.....	275.17	114			
5130	C ₁₅ H ₂₁ NO ₂	Norhyoscyamine.....	275.17	140.5			
5131	C ₁₅ H ₂₂ BrNO ₂	Homoatropine hydrobromide.....	356.09	212 d.			1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5132	C ₁₀ H ₂₂ ClNO ₃	Homoatropine hydrochloride.....	311.64	217			1333
5133	C ₁₀ H ₂₂ N ₄	<i>m</i> -Hydrazodimethylaniline.....	270.20	100			
5134	C ₁₀ H ₂₂ N ₂ O ₆ S	Caffeine sulfate.....	486.30				1333
5135	C ₁₀ H ₂₂ O ₄	Di- <i>n</i> -butyl phthalate.....	278.17		340		
5135.1	C ₁₀ H ₂₂ O ₄	Methyl santoate.....	278.17		86	1.167	1321
5136	C ₁₀ H ₂₂ O ₆	Bilinic acid.....	310.17	190			
5137	C ₁₀ H ₂₂ O ₈	Coniferin.....	342.17	185			
5138	C ₁₀ H ₂₂ O ₁₁	<i>d</i> -Glucose pentacetate.....	390.17	113			
5139	C ₁₀ H ₂₂ NO ₂	Bakankosin.....	357.19	157			
5140	C ₁₀ H ₂₄ O ₂	Methyl santalate.....	248.19		164 ¹⁰	1.002	
5141	C ₁₀ H ₂₀	Pentaethylbenzene.....	218.20	< -20	277	0.896	655
5142	C ₁₀ H ₂₀ O	Patchouli alcohol.....	234.20	56	271 d.	0.994 ⁷⁰	
5142.1	C ₁₀ H ₂₀ O	Guaiol.....	234.20	91			1176
5143	C ₁₀ H ₂₀ O ₂	Menthyl <i>l</i> -sorbinate.....	250.20		173 ¹⁴		
5143.1	C ₁₀ H ₂₀ O ₂	Diisobutyl <i>d</i> -diacetyl tartrate.....	346.20		157 ^{2,5}	1.0864 ¹⁷	
5144	C ₁₀ H ₂₇ ClN ₂ O ₂	Alypin hydrochloride.....	314.68	169			
5145	C ₁₀ H ₂₇ N ₂ O ₅	Alypin nitrate.....	341.23	152			
5146	C ₁₀ H ₂₁ N ₂	Genisteine.....	248.23	60.5	178 ²²		
5147	C ₁₀ H ₂₀ O ₂	Hydrocarpic acid.....	252.22	60			
5148	C ₁₀ H ₂₀ O ₂	Palmitolic acid.....	252.22	47	240 ¹⁵		
5149	C ₁₀ H ₂₀ O ₄	Palmitoxylic acid.....	284.22	67			
5150	C ₁₀ H ₂₀ O ₂	Gaidic acid.....	254.23	39			
5151	C ₁₀ H ₂₀ O ₂	Hypogaic acid.....	254.23	33	236 ¹⁵		
5152	C ₁₀ H ₂₀ O ₂	<i>l</i> -Menthyl <i>n</i> -capronate.....	254.23		153 ¹⁵	0.903	
5153	C ₁₀ H ₂₀ O ₂	<i>n</i> -Caprylic anhydride (C ₈ H ₁₆ CO) ₂ O.....	270.23	-1	285		
5154	C ₁₀ H ₂₀ O ₂	7-Ketopalmitic acid.....	270.23	74			
5155	C ₁₀ H ₂₁ N	Palmitonitrile CH ₃ (CH ₂) ₁₃ CH ₂ CN.....	237.25	29	251.5 ¹⁰⁰	0.822 ²¹	
5156	C ₁₀ H ₂₂	α -Hexadecylene CH ₂ :CH(CH ₂) ₁₃ CH ₃	224.25	4	274	0.789	388
5157	C ₁₀ H ₂₂ N ₂ O ₆ S	Pelletierine sulfate.....	380.33	133			
5158	C ₁₀ H ₂₀ O	Palmitic aldehyde C ₁₀ H ₂₀ CHO.....	240.25	58.5	202 ²⁹		
5159	C ₁₀ H ₂₀ O ₂	Palmitic acid C ₁₀ H ₂₀ CO ₂ H.....	256.25	64	215 ¹⁵	0.853 ⁶²	1113
5160	C ₁₀ H ₂₀ O ₂	Ethyl myristate C ₁₀ H ₂₀ CO ₂ C ₂ H ₅	256.25	10.5	295		
5161	C ₁₀ H ₂₀ O ₂	Jalapinolic acid.....	272.25	68			
5162	C ₁₀ H ₂₀ O ₂	Juniperic acid.....	272.25	95			
5163	C ₁₀ H ₂₀ O ₂	Lanopalmic acid.....	272.25	88			
5164	C ₁₀ H ₂₁ I	<i>n</i> -Cetyl iodide C ₁₀ H ₂₁ CH ₂ I.....	352.19	22	212.5 ¹⁵	1.123	535
5165	C ₁₀ H ₂₁ NO	Palmitic amide C ₁₀ H ₂₁ CONH ₂	255.26	106	236 ¹²		
5166	C ₁₀ H ₂₄	7, 8-Dimethyltetradecane.....	226.26		267.5	0.792 ¹⁴	
5167	C ₁₀ H ₂₄	<i>n</i> -Hexadecane.....	226.26	20	287.5	0.775	
5168	C ₁₀ H ₂₂ O	Cetyl alcohol C ₁₀ H ₂₁ CH ₂ OH.....	242.26	49.3	344	0.798 ^{78,9}	1108
5169	C ₁₀ H ₂₄ O	<i>n</i> -Octyl ether (C ₈ H ₁₇) ₂ O.....	242.26		291.8	0.820	
5171	C ₁₇ H ₁₀ O	Benzanthrone.....	230.08	170			
5172	C ₁₇ H ₁₁ N	α -Anthraquinoline.....	229.09	170	446		
5173	C ₁₇ H ₁₂ O	Phenyl α -naphthyl ketone.....	232.09	75.5	385		
5174	C ₁₇ H ₁₂ O	Phenyl β -naphthyl ketone.....	232.09	82			
5175	C ₁₇ H ₁₂ O ₂	Chrysenic acid.....	248.09	186.5			
5176	C ₁₇ H ₁₂ O ₂	α -Naphthyl benzoate.....	248.09	56			
5177	C ₁₇ H ₁₂ O ₂	β -Naphthyl benzoate.....	248.09	110			
5178	C ₁₇ H ₁₂ O ₂	α -Naphthyl salicylate.....	264.09	83			
5179	C ₁₇ H ₁₂ O ₂	β -Naphthyl salicylate.....	264.09	95			
5180	C ₁₇ H ₁₂ O ₅	Alpinin.....	296.09	174			
5181	C ₁₇ H ₁₂ O ₅	Pratonsol.....	296.09	225			
5182	C ₁₇ H ₁₃ NO ₂	6-Methyl-2-phenylquinoline-4-carboxylic acid.....	263.11	228			
5183	C ₁₇ H ₁₄	α -Benzyl naphthalene.....	218.11	59	350	1.165 ⁰	
5184	C ₁₇ H ₁₄	β -Benzyl naphthalene.....	218.11	35.5	350	1.176 ⁰	
5185	C ₁₇ H ₁₄ O	Dibenzylideneacetone.....	234.11	112			
5186	C ₁₇ H ₁₄ O ₂	Atronic acid.....	250.11	164			
5187	C ₁₇ H ₁₄ O ₂	Isatronic acid.....	250.11	157			
5188	C ₁₇ H ₁₄ O ₄	Nepalin.....	282.11	136			
5189	C ₁₇ H ₁₆ N ₂ O ₂	Tryptophane picrate.....	433.16	196 s. d.			
5190	C ₁₇ H ₁₆	1, 2, 4-Trimethylanthracene.....	220.12	243			
5191	C ₁₇ H ₁₆	1, 3, 6-Trimethylanthracene.....	220.12	222			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5192	C ₁₇ H ₁₆	1, 4, 6-Trimethylanthracene.....	220.12	227			
5193	C ₁₇ H ₁₆ O ₂	Eugenol benzoate.....	268.12	70	360		
5194	C ₁₇ H ₁₆ O ₂	Isoeugenol benzoate.....	268.12	104			
5195	C ₁₇ H ₁₆ O ₄	Dibenzyl malonate.....	284.12		234.5 ¹⁴ d.		
5196	C ₁₇ H ₁₇ NO ₂	Apomorphine.....	267.14	170 d.			
5197	C ₁₇ H ₁₈ ClNO ₂	Apomorphine hydrochloride.....	303.61	210			1333
5198	C ₁₇ H ₁₈ N ₂ O ₂	Antipyrine resorcinate.....	298.16	115			
5199	C ₁₇ H ₁₈ O	Dibenzylacetone CO(CH ₂ CH ₂ C ₆ H ₅) ₂ ...	238.14		224 ¹⁸		
5200	C ₁₇ H ₁₈ O ₂	Eugenol benzyl ether.....	254.14	30	235 d.		
5201	C ₁₇ H ₁₈ O ₂	Isoeugenol benzyl ether.....	254.14	59			
5202	C ₁₇ H ₁₉ NO ₃	Morphine.....	285.15	d.	193 ^{vac.}	1.317	1277
5203	C ₁₇ H ₁₉ NO ₃	α-Isomorphine.....	285.15	247			
5204	C ₁₇ H ₁₉ NO ₃	Piperine.....	285.15	129.5			
5205	C ₁₇ H ₂₀ BrNO ₃	Morphine hydrobromide.....	366.08				1333
5206	C ₁₇ H ₂₀ ClNO ₃	Morphine hydrochloride.....	321.62	250 d.			1333
5207	C ₁₇ H ₂₀ N ₂ O	Tetramethyldiaminobenzophenone.....	268.17	174	>360 s. d.		
5208	C ₁₇ H ₂₀ N ₂ O ₂	Nicotine salicylate.....	300.17	117.5			1333
5209	C ₁₇ H ₂₀ N ₂ O ₄	<i>l</i> -Arabinose diphenylhydrazone.....	316.17	218			
5211	C ₁₇ H ₂₀ N ₂ S	3, 3-Tetramethyldiaminothiobenzophe- none.....	284.24	202			
5212	C ₁₇ H ₂₀ N ₂ O ₂	<i>l</i> -Arabinosazone.....	340.19	166	200 d.		
5213	C ₁₇ H ₂₀ N ₂ O ₂	<i>d</i> -Xylosephenylosazone.....	328.19	164	167 d.		
5213.1	C ₁₇ H ₂₀ O ₂	Di-(<i>p</i> -dianisyl)dimethylmethane.....	256.15	60.5		1.150	1294
5214	C ₁₇ H ₂₀ O ₇	Tutin.....	336.15	208			
5215	C ₁₇ H ₂₀ O ₁₀	Patellaric acid.....	384.15	100			
5216	C ₁₇ H ₂₁ NO ₂	Apoatropine.....	271.17	62			
5217	C ₁₇ H ₂₁ NO ₂	Dihydromorphine.....	287.17	157			
5218	C ₁₇ H ₂₁ NO ₄	Atroscine.....	303.17	50			
5219	C ₁₇ H ₂₁ NO ₄	α-Cocaine.....	303.17	88			
5220	C ₁₇ H ₂₁ NO ₄	<i>dl</i> -Cocaine.....	303.17	80			
5221	C ₁₇ H ₂₁ NO ₄	<i>d</i> (<i>l</i>)-Cocaine.....	303.17	98			1326
5222	C ₁₇ H ₂₁ NO ₄	Hyoscine.....	303.17	55			1333
5223	C ₁₇ H ₂₁ NO ₄	<i>dl</i> -Pseudococaine.....	303.17	81.5		1.103 ^{99.5}	1139
5224	C ₁₇ H ₂₁ NO ₄	<i>d</i> -Pseudococaine.....	303.17	41		1.102 ^{99.6}	1142
5225	C ₁₇ H ₂₁ N ₃	Auramine.....	267.19	136			
5226	C ₁₇ H ₂₂ BrNO ₄	Hyoscine hydrobromide.....	384.09	194			1333
5227	C ₁₇ H ₂₂ ClNO ₂	Apoatropine hydrochloride.....	307.64	239			1333
5228	C ₁₇ H ₂₂ ClNO ₄	Cocaine hydrochloride.....	339.64	187			1257
5229	C ₁₇ H ₂₂ ClNO ₄	Hyoscine hydrochloride.....	339.64				1333
5230	C ₁₇ H ₂₂ N ₂	<i>p</i> -(Tetramethyldiamino)-diphenyl- methane.....	254.19	91			
5231	C ₁₇ H ₂₂ N ₂ O	<i>p</i> -(Tetramethyldiamino)-diphenyl carbi- nol [<i>p</i> -(CH ₂) ₂ NC ₆ H ₄] ₂ CHOH.....	270.19	96			
5232	C ₁₇ H ₂₂ O ₂	Podocarpic acid.....	274.17	188			
5233	C ₁₇ H ₂₂ O ₂	Guaiacyl acid camphorate.....	306.17	112			
5234	C ₁₇ H ₂₂ O ₂	Syringin.....	370.17	192			
5235	C ₁₇ H ₂₃ NO ₃	Atropine.....	289.19	115.5			1333
5236	C ₁₇ H ₂₃ NO ₃	<i>d</i> -Hyoscyamine.....	289.19	106			
5237	C ₁₇ H ₂₃ NO ₃	Pseudoatropine.....	289.19	120			
5238	C ₁₇ H ₂₄ BrNO ₃	Atropine hydrobromide.....	370.11	162			1333
5239	C ₁₇ H ₂₄ BrNO ₃	Hyoscyamine hydrobromide.....	370.11	152			1333
5240	C ₁₇ H ₂₄ ClNO ₃	Atropine hydrochloride.....	325.65	165			1333
5241	C ₁₇ H ₂₄ ClNO ₃	Hyoscyamine hydrochloride.....	325.65				1333
5242	C ₁₇ H ₂₄ N ₂ O ₂ S	Sinapine thiocyanate.....	368.27	176			
5243	C ₁₇ H ₂₄ N ₂ O ₂	Atropine nitrate.....	352.20				1333
5244	C ₁₇ H ₂₄ O ₂	Menthyl benzoate.....	260.19	54.5	288	0.808	
5244.1	C ₁₇ H ₂₄ O ₄	Ethyl santoate.....	292.19	89		1.148	1322
5245	C ₁₇ H ₂₄ O ₁₀	Verbenalin.....	388.19	181.6			
5246	C ₁₇ H ₂₅ NO ₂	Eupphthalmine.....	291.20	113			
5247	C ₁₇ H ₂₅ O ₄	Scillitin.....	325.19	154			
5248	C ₁₇ H ₂₆ ClNO ₂	Eupphthalmine hydrochloride.....	327.67	183			
5249	C ₁₇ H ₂₆ O	Benzylmenthol.....	246.20	111	183 ¹⁰		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5250	C ₁₇ H ₃₆ O	Phellyl alcohol.....	248.22	100			
5251	C ₁₇ H ₃₄ NO ₂	Ajaconine.....	279.23	163			
5252	C ₁₇ H ₃₂ O ₃	Jalapic acid.....	378.23	120			
5253	C ₁₇ H ₃₂ O ₂	<i>l</i> -Menthyl heptylate.....	268.25		165 ¹⁵	0.901	
5254	C ₁₇ H ₃₄	8-Heptadecene C ₇ H ₁₃ CH:CHC ₆ H ₁₃	238.26		160 ^{9,5}	0.798 ¹⁰	
5255	C ₁₇ H ₃₄ O	Margaric aldehyde C ₁₆ H ₃₂ CHO.....	254.26	36	204 ²⁶		
5256	C ₁₇ H ₃₄ O ₂	Daturic acid.....	270.26	60	227 ¹⁰⁰		
5257	C ₁₇ H ₃₄ O ₂	Margaric acid C ₁₆ H ₃₂ CO ₂ H.....	270.26	59.9	227 ¹⁰⁰	0.853 ⁴⁰	
5258	C ₁₇ H ₃₄ O ₂	Methyl palmitate C ₁₆ H ₃₂ CO ₂ CH ₃	270.26	29.5	196 ¹⁵		1119
5259	C ₁₇ H ₃₄ NO ₂	Sphingosine.....	285.28	244	250 d.		
5260	C ₁₇ H ₃₆	<i>n</i> -Heptadecane CH ₃ (CH ₂) ₁₄ CH ₃	240.28	22.5	303	0.778	359
5261	C ₁₇ H ₃₆ O	Heptadecane-9-ol C ₈ H ₁₇ CH(OH)C ₈ H ₁₇	256.28	61			
5262	C ₁₇ H ₃₇ N	Heptadecylamine C ₁₇ H ₃₅ NH ₂	255.29	49	340		
5263	C ₁₈ H ₁₂	Benzanthrene.....	228.09	84			
5264	C ₁₈ H ₁₂	Chrysene.....	228.09	251	448		
5265	C ₁₈ H ₁₂	Triphenylene.....	228.09	198.5			
5266	C ₁₈ H ₁₂	Truxene.....	228.09	>360			
5267	C ₁₈ H ₁₂ N ₂	2, 3'-Diquinolyl.....	256.11	176			
5268	C ₁₈ H ₁₂ N ₂	2, 7'-Diquinolyl.....	256.11	193			
5269	C ₁₈ H ₁₂ N ₂	6, 6'-Diquinolyl.....	256.11	178			
5270	C ₁₈ H ₁₂ N ₂	8, 8'-Diquinolyl.....	256.11	205			
5271	C ₁₈ H ₁₂ O ₂	<i>o</i> -(α -Naphthoyl) benzoic acid.....	276.09	173.5			
5272	C ₁₈ H ₁₂ O ₅	Calycin.....	308.09	240			
5273	C ₁₈ H ₁₂ N	Aminochrysene.....	243.11	203			
5274	C ₁₈ H ₁₄	<i>p</i> -Diphenylbenzene C ₆ H ₄ (C ₆ H ₅) ₂	230.11	205	427		
5275	C ₁₈ H ₁₄ O ₃	Cinnamic anhydride (C ₆ H ₅ CH:CHCO) ₂ O.....	278.11	135			
5276	C ₁₈ H ₁₄ O ₄	Epicaric acid.....	294.11	195			
5277	C ₁₈ H ₁₄ O ₇	Xanthoeridol.....	342.11	258			
5278	C ₁₈ H ₁₄ O ₈	Diaspirin (Succinylidialicylic acid).....	358.11	178			
5279	C ₁₈ H ₁₅ As	Triphenylarsine (C ₆ H ₅) ₃ As.....	306.08	60			
5280	C ₁₈ H ₁₅ Bi	Triphenyl bismuthine (C ₆ H ₅) ₃ Bi.....	440.16	78		1.585 ²⁰	
5281	C ₁₈ H ₁₅ N	Triphenylamine (C ₆ H ₅) ₃ N.....	245.12	126.5	365	0.774 ⁹	
5282	C ₁₈ H ₁₅ O ₂ P	Triphenyl phosphite (C ₆ H ₅ O) ₃ P.....	310.14		220 ¹¹	1.184 ¹⁸	
5283	C ₁₈ H ₁₅ O ₄ P	Triphenyl phosphate (C ₆ H ₅ O) ₃ PO.....	326.14	49.9	245 ¹¹		
5284	C ₁₈ H ₁₅ P	Triphenylphosphine (C ₆ H ₅) ₃ P.....	262.14	79	>360	1.194	
5285	C ₁₈ H ₁₅ Sb	Triphenylstibine (C ₆ H ₅) ₃ Sb.....	352.89	48	>360	1.500 ¹²	
5286	C ₁₈ H ₁₆ NO ₂	Aporheine.....	278.13	89	290 d.		
5287	C ₁₈ H ₁₆ N ₂	Diphenyl- <i>m</i> -phenylenediamine.....	260.14	95			
5288	C ₁₈ H ₁₆ N ₂	Triphenylhydrazine (C ₆ H ₅) ₃ NNHC ₆ H ₅	260.14	142		0.869 ⁷⁰	
5289	C ₁₈ H ₁₆ N ₂ O ₂	Analgen.....	292.14	210			
5290	C ₁₈ H ₁₆ N ₂ O ₃	5, 5'-Dibenzylbarbituric acid.....	308.14	222			
5291	C ₁₈ H ₁₆ N ₂ O ₆ S	Chinosol.....	388.20	177.5			
5292	C ₁₈ H ₁₆ O ₂	Cinnamyl cinnamate.....	264.12	44		1.085 ^{16,5}	
5293	C ₁₈ H ₁₆ O ₄	α -Isatropic acid.....	296.12	237			
5294	C ₁₈ H ₁₆ O ₄	β -Isatropic acid.....	296.12	206			
5295	C ₁₈ H ₁₆ O ₄	α -Truxillic acid.....	296.12	272			
5296	C ₁₈ H ₁₆ O ₄	Isotruxillic acid.....	296.12	206			
5297	C ₁₈ H ₁₆ O ₄	γ -Truxillic acid.....	296.12	228			
5298	C ₁₈ H ₁₆ O ₄	δ -Truxillic acid.....	296.12	174			
5299	C ₁₈ H ₁₆ O ₄	ϵ -Truxillic acid.....	296.12	192			
5300	C ₁₈ H ₁₆ O ₄	η -Truxillic acid.....	296.12	260			
5301	C ₁₈ H ₁₆ O ₄	Dibenzyl fumarate.....	296.12	59.5	211 ⁵		
5302	C ₁₈ H ₁₆ O ₄	Nepodin.....	296.12	158			
5303	C ₁₈ H ₁₆ O ₇	<i>dl</i> -Usnic acid.....	344.12	193			
5304	C ₁₈ H ₁₆ O ₇	<i>d</i> (<i>l</i>)-Usnic acid.....	344.12	203			
5305	C ₁₈ H ₁₆ O ₁₄	Igasuric acid (Chlorogenic acid).....	456.12	207			
5306	C ₁₈ H ₁₈	Retene.....	234.14	98.5	394	1.13 ¹⁶	
5307	C ₁₈ H ₁₈	1, 3, 5, 7-Tetramethylantracene.....	234.14	280 d.			
5308	C ₁₈ H ₁₈ N ₂ O ₄	Antipyrine salicylate.....	326.16	92			
5308.1	C ₁₈ H ₁₈ N ₂	Vesuvine.....	346.20	143.5			
5310	C ₁₈ H ₁₈ O ₄	Dibenzyl succinate.....	298.14	45	238 ¹⁴		
5312	C ₁₈ H ₁₉ NO ₂	Berbamine.....	297.15	200			
5313	C ₁₈ H ₁₉ N ₂ O ₂	Dimazon (Diacetylaminoazotoluene).....	309.17	75			
5314	C ₁₈ H ₂₀ BrNO ₂	Apomorphine methobromide.....	362.08	180			1295

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5315	C ₁₈ H ₃₀ N ₂ O ₂	Cinchotennine.....	312.17	198			
5316	C ₁₈ H ₃₁ NO ₂	Bebeerine.....	299.17	214			
5317	C ₁₈ H ₃₁ NO ₂	Codeine.....	299.17	155	179	1.315 ¹⁴	1283, 1286
5318	C ₁₈ H ₃₁ NO ₂	Isobebeerine.....	299.17	297			
5319	C ₁₈ H ₃₁ NO ₂	Isocodeine.....	299.17	144	d.		1288
5320	C ₁₈ H ₃₁ NO ₂	Pseudocodeine.....	299.17	181		1.290 ¹³⁰	1264
5321	C ₁₈ H ₃₂ BrNO ₂	Codeine hydrobromide.....	380.09				1333
5322	C ₁₈ H ₃₂ BrNO ₂	Morphine methylbromide.....	380.09	265 d.			
5323	C ₁₈ H ₃₂ ClNO ₂	Bebeerine hydrochloride.....	335.64	260			
5324	C ₁₈ H ₃₂ ClNO ₂	Codeine hydrochloride.....	335.64	264			1333
5325	C ₁₈ H ₃₂ N ₂ O ₂	Holocaine.....	298.19	117			
5325.1	C ₁₈ H ₃₂ N ₂ O ₂	Pilocarpine salicylate.....	346.19	120			1333
5326	C ₁₈ H ₃₂ N ₄ O ₄	Galactosazone.....	358.20	201	202 d.		
5327	C ₁₈ H ₃₂ N ₄ O ₄	<i>d</i> -Glucosazone.....	358.20	208 d.			
5328	C ₁₈ H ₃₂ N ₄ O ₄	<i>l</i> -Glucosazone.....	358.20	205 d.			
5329	C ₁₈ H ₃₂ N ₄ O ₄	Gulososazone.....	358.20	168	180 d.		
5330	C ₁₈ H ₃₂ O ₁₀	Murrayin.....	398.17	170			
5331	C ₁₈ H ₃₂ ClN ₂ O ₂	Holocaine hydrochloride.....	334.65	189			
5332	C ₁₈ H ₃₂ NO ₆	Cocaine formate.....	349.19	42			
5333	C ₁₈ H ₃₄ NO ₇ P	Codeine phosphate.....	397.22	235			1333
5334	C ₁₈ H ₃₆ O ₂	Menthyl phenylacetate.....	274.20		205.5 ²⁵	1.002	
5335	C ₁₈ H ₃₆ O ₄	Diamyl phthalate.....	306.20		344		
5336	C ₁₈ H ₃₇ NO ₂	Capsaicin.....	305.22	65			1226
5337	C ₁₈ H ₃₇ NO ₂	Senecifoline.....	385.22	194			
5338	C ₁₈ H ₃₈ ClNO ₂	Senecifoline hydrochloride.....	421.68	260			
5339	C ₁₈ H ₃₈ O ₄	Embellic acid.....	308.22	142			
5340	C ₁₈ H ₃₀	Hexaethylbenzene C ₆ (C ₂ H ₅) ₆	246.23	129	298	0.831 ^{130.4}	1159
5341	C ₁₈ H ₃₀ O	Sycoceryl alcohol.....	262.23	90			
5342	C ₁₈ H ₃₀ O ₂	Linolenic acid.....	278.23		232 ¹⁷	0.914	
5343	C ₁₈ H ₃₁ ClN ₂ O ₄	<i>d</i> -Ecgonine hydrochloride.....	406.71	247			
5343.1	C ₁₈ H ₃₂	Fichtelite.....	248.25	46		1.010	1247
5344	C ₁₈ H ₃₂ O ₂	Chaulmoogric acid.....	280.25	69	248 ²⁰		
5345	C ₁₈ H ₃₂ O ₂	α -Eleostearic acid.....	280.25	49	235 ¹²		
5346	C ₁₈ H ₃₂ O ₂	Linoleic acid.....	280.25	< -18	230 ¹⁶	0.903	
5347	C ₁₈ H ₃₂ O ₂	Stearic acid C ₈ H ₁₇ C:CH(CH ₂) ₇ CO ₂ H.....	280.25	48	260		
5348	C ₁₈ H ₃₂ O ₂	Tariric acid.....	280.25	50.5			
5349	C ₁₈ H ₃₂ O ₄	Stearoxylic acid.....	312.25	86			
5350	C ₁₈ H ₃₂ O ₁₆	Raffinose.....	504.25	119	130 d.	1.465	
5351	C ₁₈ H ₃₂ O ₁₆	Procetlose.....	504.25	210			
5352	C ₁₈ H ₃₂ N ₂ O ₁₃	Piperazine quinate (Sidonal).....	469.27	171			
5353	C ₁₈ H ₃₄	Hexadecylacetylene C ₁₈ H ₃₄ C:CH.....	250.26	26	180 ¹⁵	0.798 ²⁶	
5354	C ₁₈ H ₃₄	1-Methyl-2-pentadecylacetylene.....	250.26	30	184 ¹⁵	0.802	
5355	C ₁₈ H ₃₄ O	Chaulmoogryl alcohol.....	266.26	36			
5356	C ₁₈ H ₃₄ O	Oleic aldehyde.....	266.26		169 ⁴	0.851 ¹⁵	456
5357	C ₁₈ H ₃₄ O ₂	Elaidic acid.....	282.26	51.5	288 ¹⁰⁰	0.851 ^{79.4}	
5358	C ₁₈ H ₃₄ O ₂	Gynocardic acid.....	282.26	67.5			
5359	C ₁₈ H ₃₄ O ₂	Oleic acid C ₈ H ₁₇ CH:CH(CH ₂) ₇ CO ₂ H.....	282.26	14	286 ¹⁰⁰	0.895 ^{17.7}	929
5360	C ₁₈ H ₃₄ O ₂	Petroselinic acid.....	282.26	34		0.868 ⁴⁰	1057
5361	C ₁₈ H ₃₄ O ₂	Rapic acid.....	282.26	14		0.897 ¹⁵	
5362	C ₁₈ H ₃₄ O ₂	<i>l</i> -Menthyl <i>n</i> -caprylate.....	282.26		175 ¹⁵	0.898	
5363	C ₁₈ H ₃₄ O ₂	3-Ketostearic acid.....	298.26	97			
5364	C ₁₈ H ₃₄ O ₂	6-Ketostearic acid.....	298.26	75			
5365	C ₁₈ H ₃₄ O ₂	8-Ketostearic acid.....	298.26	83			
5366	C ₁₈ H ₃₄ O ₂	9-Ketostearic acid.....	298.26	76			
5367	C ₁₈ H ₃₄ O ₂	10-Ketostearic acid.....	298.26	65			
5368	C ₁₈ H ₃₄ O ₂	Ricinelaidic acid.....	298.26	53	250 ¹⁵		
5369	C ₁₈ H ₃₄ O ₂	Ricinic acid.....	298.26	81	252 ¹⁵		
5370	C ₁₈ H ₃₄ O ₂	Ricinoleic acid.....	298.26	17	250 ¹⁵	0.945 ¹⁵	
5371	C ₁₈ H ₃₄ O ₂	Oleic acid ozonide.....	330.26			1.022	472
5371.1	C ₁₈ H ₃₄ O ₆	Di- <i>n</i> -heptyl tartrate.....	346.26	35	235 ¹⁴	0.999 ⁴¹	
5372	C ₁₈ H ₃₄ O ₁₆	Clavisepsin.....	506.26	198			
5373	C ₁₈ H ₃₅ ClO	Stearyl chloride C ₁₇ H ₃₅ COCl.....	302.73	23	215 ¹⁵		
5374	C ₁₈ H ₃₅ N	Stearonitrile C ₁₇ H ₃₅ CN.....	265.28	41	214 ¹³		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5375	C ₁₈ H ₃₅ NO	Oleicamide.....	281.28	76			
5376	C ₁₈ H ₃₅ NO ₂	Oleohydroxamic acid.....	297.28	61			
5377	C ₁₈ H ₃₆	<i>n</i> -Octadecylene.....	252.28	18	179 ¹⁵	0.791	
5378	C ₁₈ H ₃₆ O	Stearic aldehyde C ₁₇ H ₃₅ CHO.....	268.28	63.5	261 ¹⁰⁰		
5379	C ₁₈ H ₃₆ O ₂	Stearic acid C ₁₇ H ₃₅ CO ₂ H.....	284.28	69.3	383	0.847 ^{99,3}	1117
5380	C ₁₈ H ₃₆ O ₂	Cetyl acetate CH ₃ CO ₂ C ₁₆ H ₃₃	284.28	18.5	200.5 ¹⁵	0.858	1041
5381	C ₁₈ H ₃₆ O ₂	Ethyl palmitate C ₁₅ H ₃₁ CO ₂ C ₂ H ₅	284.28	24.2	185.5 ¹⁰		1043
5382	C ₁₈ H ₃₆ O ₂	Methyl margarate.....	284.28	29			
5383	C ₁₈ H ₃₆ O ₂	1-Hydroxystearic acid.....	300.28	85			
5384	C ₁₈ H ₃₆ O ₂	<i>dl</i> -2-Hydroxystearic acid.....	300.28	85			
5385	C ₁₈ H ₃₆ O ₂	9-Hydroxystearic acid.....	300.28	81.5			
5386	C ₁₈ H ₃₆ O ₂	10-Hydroxystearic acid.....	300.28	79			
5387	C ₁₈ H ₃₆ O ₂	11-Hydroxystearic acid.....	300.28	78			
5388	C ₁₈ H ₃₆ O ₄	4, 9-Dihydroxystearic acid.....	316.28	136.5			
5389	C ₁₈ H ₃₇ I	<i>n</i> -Octadecyl iodide.....	380.22	34	170 ^{6,6}		
5390	C ₁₈ H ₃₇ NO	Stearic amide C ₁₇ H ₃₅ CONH ₂	283.29	109	251 ¹²		
5391	C ₁₈ H ₃₈	<i>n</i> -Octadecane CH ₃ (CH ₂) ₁₆ CH ₃	254.29	28	317	0.777	1047
5392	C ₁₈ H ₃₈ O	<i>n</i> -Octadecyl alcohol.....	270.29	58.5	210.5 ¹⁶	0.812 ^{4,9}	
5394	C ₁₈ H ₃₈ O	Benzylideneacenaphthenone.....	256.09	107			
5395	C ₁₈ H ₁₉ N	9-Phenylacridine.....	255.11	181	404		
5396	C ₁₈ H ₁₉ N ₃ O ₄	Tri- <i>p</i> -nitrophenylmethane.....	379.12	207			
5397	C ₁₈ H ₁₉ O ₂	Aurine.....	290.11	> 220			
5398	C ₁₈ H ₁₉ O ₆	Oroxilin.....	338.11	225			
5399	C ₁₈ H ₁₉	Triphenylmethyl (C ₆ H ₅) ₃ C.....	243.12	147			
5400	C ₁₈ H ₁₉ Cl	Triphenylchloromethane (C ₆ H ₅) ₃ CCl.....	278.57	112	310		
5401	C ₁₈ H ₁₉ N ₃	Chrysaniline.....	285.14	270			
5402	C ₁₈ H ₁₉	Triphenylmethane (C ₆ H ₅) ₃ CH.....	244.12	92.5	359.2	1.014 ^{9,9}	1128
5403	C ₁₈ H ₁₉ N ₂	Benzophenone phenylhydrazone.....	272.14	137			
5404	C ₁₈ H ₁₉ O	Triphenyl carbinol (C ₆ H ₅) ₃ COH.....	260.12	162.5	> 360	1.188	
5405	C ₁₈ H ₁₉ O ₂	Triphenyl orthoformate HC(OC ₆ H ₅) ₃	292.12	77	277 ¹⁰		
5406	C ₁₈ H ₁₇ N	<i>m</i> -Aminotriphenylmethane.....	259.14	120			
5407	C ₁₈ H ₁₇ N	<i>p</i> -Aminotriphenylmethane.....	259.14	84			
5408	C ₁₈ H ₁₇ N	Diphenylbenzylamine.....	259.14	87			
5409	C ₁₈ H ₁₇ N	Triphenylmethylamine (C ₆ H ₅) ₃ C.NH ₂	259.14	105			
5410	C ₁₈ H ₁₇ NO ₂	Novatophan.....	291.14	76			
5411	C ₁₈ H ₁₇ NO ₂	Cusparidine.....	307.14	79			
5412	C ₁₈ H ₁₇ NO ₂	Cusparine.....	307.14	92			
5413	C ₁₈ H ₁₇ NO ₂	Isocusparine.....	307.14	194			
5414	C ₁₈ H ₁₇ N ₃	α-Triphenylguanidine.....	287.16	145	d.		
5415	C ₁₈ H ₁₇ N ₃	β-Triphenylguanidine.....	287.16	131			
5416	C ₁₈ H ₁₉ ClN ₃	α-Triphenylguanidine hydrochloride.....	323.62	241		0.875 ¹⁰	
5417	C ₁₈ H ₁₉ N ₂	<i>p</i> , <i>p'</i> -Diaminotriphenylmethane.....	274.16	140			
5418	C ₁₈ H ₁₉ O ₂	Eugenol cinnamate.....	294.14	90			
5419	C ₁₈ H ₁₉ O ₇	Eriodonol.....	358.14	199			
5420	C ₁₈ H ₁₉ O ₈	Atranoric acid.....	374.14	197			
5421	C ₁₈ H ₁₉ O ₁₁	Euxanthic acid.....	422.14	162	d.		
5422	C ₁₈ H ₁₉ NO ₂	Ditamine.....	293.15	75			
5423	C ₁₈ H ₁₉ NO ₂	Galipidine.....	309.15	111			
5424	C ₁₈ H ₁₉ NO ₄	Bulbocapnine.....	325.15	199			1332
5425	C ₁₈ H ₁₉ NO ₆	Stylophine.....	341.15	202			
5426	C ₁₈ H ₁₉ N ₃	α-Leucaniline (NH ₂ C ₆ H ₄) ₃ CH.....	289.17	165			
5427	C ₁₈ H ₁₉ N ₃	<i>p</i> -Leucaniline (NH ₂ C ₆ H ₄) ₃ CH.....	289.17	148			
5428	C ₁₈ H ₁₉ N ₂ O	Pararosanine (NH ₂ C ₆ H ₄) ₂ C(OH).....	305.17	189			
5428.1	C ₁₈ H ₂₀ N ₂ O	Cinchoninone.....	292.17	127		1.226	1301
5429	C ₁₈ H ₂₀ N ₂ O ₄	Antipyrine mandelate.....	340.17	53			
5430	C ₁₈ H ₂₀ N ₂ O ₄	<i>dl</i> -Ornithuric acid.....	340.17	183			
5431	C ₁₈ H ₂₀ O ₄	Diethyl diphenylmalonate.....	312.15	59			
5432	C ₁₈ H ₂₀ O ₆	Guaiaconic acid.....	328.15	100			
5433	C ₁₈ H ₂₁ NO ₂	Isothebaine.....	311.17	204			
5434	C ₁₈ H ₂₁ NO ₂	Oxyacanthine.....	311.17	210			
5435	C ₁₈ H ₂₁ NO ₂	Thebaine.....	311.17	193		1.305	
5436	C ₁₈ H ₂₁ NO ₂	Eupyrin.....	343.17	88			
5437	C ₁₈ H ₂₂ N ₂	Desoxycinchonidine.....	278.19	61			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5438	C ₁₉ H ₂₃ N ₂	Desoxycinchonine.....	278.19	92			
5439	C ₁₉ H ₂₃ N ₂ O	Apocinchonine.....	294.19	228			
5440	C ₁₉ H ₂₃ N ₂ O	Cinchonicine.....	294.19	59			
5441	C ₁₉ H ₂₃ N ₂ O	Cinchonidine.....	294.19	210			1278
5442	C ₁₉ H ₂₃ N ₂ O	α-Cinchonine.....	294.19	264.3			1304
5443	C ₁₉ H ₂₃ N ₂ O	Homocinchonidine.....	294.19	207.6			
5444	C ₁₉ H ₂₃ N ₂ O	β-Isocinchonine.....	294.19	126			
5445	C ₁₉ H ₂₃ N ₂ O ₂	Apoconquinine.....	310.19	137			
5446	C ₁₉ H ₂₃ N ₂ O ₂	Apoquinine.....	310.19	210 d.			
5447	C ₁₉ H ₂₃ N ₂ O ₂	Cupreine.....	310.19	202			
5448	C ₁₉ H ₂₃ N ₂ O ₄	Chitenine.....	342.19	286 d.			
5451	C ₁₉ H ₂₃ ClN ₂ O	Cinchonidine hydrochloride.....	330.65	242 d.			
5452	C ₁₉ H ₂₃ ClN ₂ O	Cinchonine hydrochloride.....	330.65	218 d.			1333
5453	C ₁₉ H ₂₃ NO ₃	Codethyline.....	313.19	93			
5454	C ₁₉ H ₂₃ NO ₄	Cinnamylcocaine.....	329.19	121			
5455	C ₁₉ H ₂₃ NO ₄	Corytuberine.....	329.19	240			
5456	C ₁₉ H ₂₃ NO ₄	Porphyroxime.....	329.19	135			
5457	C ₁₉ H ₂₃ NO ₄	Sinomenine.....	329.19	161			
5458	C ₁₉ H ₂₃ NO ₅	Morphine acetate.....	345.19	200 d.			
5459	C ₁₉ H ₂₃ N ₂ O ₄	Cinchonine nitrate.....	357.20				1333
5460	C ₁₉ H ₂₃ BrNO ₂	Eucodine (Methylcodeine bromide).....	394.11	261			
5461	C ₁₉ H ₂₃ ClNO ₂ (2H ₂ O)	Dionine.....	349.65	123	170 d.		
5462	C ₁₉ H ₂₄ N ₂ O	Cinchamidine (Hydrocinchonidine).....	296.20	230			
5463	C ₁₉ H ₂₄ N ₂ O	Cinchonamine.....	296.20	185			
5464	C ₁₉ H ₂₄ N ₂ O	Cinchotine.....	296.20	286			
5465	C ₁₉ H ₂₄ N ₂ O	Pereirine.....	296.20	124			
5466	C ₁₉ H ₂₄ N ₂ O ₂	Conquinamine.....	312.20	123			
5467	C ₁₉ H ₂₄ N ₂ O ₂	Geissospermine.....	312.20	189			
5468	C ₁₉ H ₂₄ N ₂ O ₂	Hydrocupreine.....	312.20	230			
5469	C ₁₉ H ₂₄ N ₂ O ₂	Quinamine.....	312.20	172			
5473	C ₁₉ H ₂₄ N ₂ O ₄	Ionidine.....	373.23	156			
5474	C ₁₉ H ₂₄ N ₂ O	Aspidosine.....	298.22	245			
5475	C ₁₉ H ₂₇ NO ₄	α-Eucaine.....	333.22	103			
5476	C ₁₉ H ₂₈ ClNO ₄	α-Eucaine hydrochloride.....	369.68	200			
5477	C ₁₉ H ₂₈ O ₂	Abietic acid.....	288.22	161			1251
5478	C ₁₉ H ₂₈ O ₄	Convallaretin.....	320.22	>255			
5479	C ₁₉ H ₂₈ O ₁₃	Calmatambin.....	464.22	144			
5480	C ₁₉ H ₃₀ O ₂	Benzyl laurate C ₁₁ H ₂₃ CO ₂ CH ₂ C ₆ H ₅	290.23	8.5	211 ¹²	0.946 ¹⁵	540
5481	C ₁₉ H ₃₄ O ₂	Methyl chaulmoograte.....	294.26	22	227 ²⁰	0.912 ¹⁵	
5482	C ₁₉ H ₃₆ O ₂	Methyl ricinolate.....	312.28		245 ¹⁰	0.924	465
5483	C ₁₉ H ₃₈ O ₂	Nondecylic acid CH ₃ (CH ₂) ₁₇ CO ₂ H.....	298.29	66	299 ¹⁰⁰		
5484	C ₁₉ H ₃₈ O ₂	Ethyl margarate CH ₃ (CH ₂) ₁₅ CO ₂ C ₂ H ₅	298.29	27			
5485	C ₁₉ H ₃₈ O ₂	Methyl stearate C ₁₇ H ₃₅ CO ₂ CH ₃	298.29	38	215 ¹⁴		
5486	C ₁₉ H ₄₀	n-Nondecane CH ₃ (CH ₂) ₁₇ CH ₃	268.31	32	330	0.777 ¹¹	1045
5487	C ₂₀ H ₁₀ I ₄ O ₄	Nosophen (Tetraiodophenolphthalein).....	821.81	225			
5488	C ₂₀ H ₁₂	Perylene.....	252.09	264			
5489	C ₂₀ H ₁₂ O ₃	Fluoran.....	300.09	175			
5490	C ₂₀ H ₁₂ O ₆	Fluorescein.....	332.09		290 d.		
5491	C ₂₀ H ₁₄	α, α'-Dinaphthyl C ₁₀ H ₇ .C ₁₀ H ₇	254.11	160.5	360		
5492	C ₂₀ H ₁₄	α, β'-Dinaphthyl.....	254.11	80			
5493	C ₂₀ H ₁₄	β, β'-Dinaphthyl C ₁₀ H ₇ .C ₁₀ H ₇	254.11	187.8	452		
5494	C ₂₀ H ₁₄	9-Phenylanthracene.....	254.11	153	417		
5495	C ₂₀ H ₁₄ N ₂	α, α'-Azonaphthalene.....	282.12	190			
5496	C ₂₀ H ₁₄ N ₂	β, β'-Azonaphthalene.....	282.12	204			
5497	C ₂₀ H ₁₄ N ₂ O	α, α'-Azoxynaphthalene.....	298.12	127			
5498	C ₂₀ H ₁₄ N ₂ O	β, β'-Azoxynaphthalene.....	298.12	167			
5499	C ₂₀ H ₁₄ O	α-Naphthyl ether (C ₁₀ H ₇) ₂ O.....	270.11	110	>360		
5500	C ₂₀ H ₁₄ O	β-Naphthyl ether (C ₁₀ H ₇) ₂ O.....	270.11	105	250 ¹⁹		
5501	C ₂₀ H ₁₄ O	α, β'-Naphthyl ether.....	270.11	81	264 ¹⁴		
5502	C ₂₀ H ₁₄ O ₂	α-Dinaphthol.....	286.11	300			
5503	C ₂₀ H ₁₄ O ₂	β-Dinaphthol.....	286.11	218			
5504	C ₂₀ H ₁₄ O ₄	Phenolphthalein.....	318.11	261		1.277 ¹²	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5505	C ₁₆ H ₁₄ O ₅	Fluorescein.....	334.11	127			
5506	C ₁₆ H ₁₄ O ₉	Psoromic acid.....	398.11	264			
5507	C ₂₀ H ₁₄ S	α, α'-Dinaphthyl sulfide (C ₁₀ H ₇) ₂ S.....	286.17	110	290 ¹⁵		
5508	C ₂₀ H ₁₄ N	β, β'-Dinaphthylamine (C ₁₀ H ₇) ₂ NH.....	269.12	172.2	471		
5509	C ₂₀ H ₁₄ NO ₄	Sanguinarine.....	333.12	213			
5510	C ₂₀ H ₁₄ NO ₅	Berilic acid.....	397.12	200			
5511	C ₂₀ H ₁₄ N ₂	p-Amino-α-azonaphthalene.....	297.14	175			
5512	C ₂₀ H ₁₄ N ₂	Amino-β-azonaphthalene.....	297.14	156			
5513	C ₂₀ H ₁₄ N ₂	α, α'-Hydrazonaphthalene.....	284.14	α 271; β 274			
5514	C ₂₀ H ₁₄ N ₂	β, β'-Hydrazonaphthalene.....	284.14	164			
5515	C ₂₀ H ₁₄ N ₂ O	Benzilphenylhydrazone.....	300.14	134			
5516	C ₂₀ H ₁₄ N ₄	Nitron.....	312.16	189 d.			
5517	C ₂₀ H ₁₆ O ₂	Triphenylacetic acid (C ₆ H ₅) ₃ C.CO ₂ H...	288.12	265			
5518	C ₂₀ H ₁₆ O ₂	Rosolic acid.....	304.12	270	d.		
5519	C ₂₀ H ₁₇ N ₂ O ₂	Rubazonic acid.....	359.17	181			
5520	C ₂₀ H ₁₈	Diphenyl- <i>m</i> -tolylmethane.....	258.14	61.5	356	1.07 ¹⁶	
5521	C ₂₀ H ₁₈	1, 1, 2-Triphenylethane.....	258.14	54	349.4		
5522	C ₂₀ H ₁₈ ClNO ₄	Berberine hydrochloride.....	371.61			1.397	1333
5523	C ₂₀ H ₁₈ N ₂ O	α-Benzoinphenylhydrazone.....	302.16	155			
5524	C ₂₀ H ₁₈ N ₂ O	β-Benzoinphenylhydrazone.....	302.16	106			
5525	C ₂₀ H ₁₈ N ₂ S	Triphenylguanlythiourea.....	346.24	157			
5526	C ₂₀ H ₁₉ N	Dibenzylaniline C ₆ H ₅ N(CH ₂ C ₆ H ₅) ₂	273.15	70			
5527	C ₂₀ H ₁₉ NO ₅	Chelidone.....	353.15	136			
5528	C ₂₀ H ₁₉ NO ₅	Papaveraldine.....	353.15	210			
5529	C ₂₀ H ₁₉ NO ₅	Protopine.....	353.15	207			
5530	C ₂₀ H ₁₉ NO ₅	Berberilic acid.....	417.15	182			
5532	C ₂₀ H ₂₀ N ₂ O ₅	Antipyrine acetylsalicylate.....	368.17	65			
5533	C ₂₀ H ₂₀ O ₅	Cubebinol.....	340.15	92			
5534	C ₂₀ H ₂₀ O ₅	Cubebin.....	356.15	132			
5535	C ₂₀ H ₂₀ O ₇	Coccelic acid.....	372.15	178			
5536	C ₂₀ H ₂₀ O ₁₀	Scoparin.....	420.15	219 d.			
5537	C ₂₀ H ₂₀ O ₁₂	Luteic acid.....	452.15	274			
5538	C ₂₀ H ₂₁ NO ₃	Galipeine.....	323.17	115			
5539	C ₂₀ H ₂₁ NO ₄	<i>l</i> -Canadine.....	339.17	134			
5540	C ₂₀ H ₂₁ NO ₄	Dicentrine.....	339.17	169			
5541	C ₂₀ H ₂₁ NO ₄	Papaverine.....	339.17	147	d.	1.337	1331
5542	C ₂₀ H ₂₁ NO ₄	<i>dl</i> -Canadine.....	339.17	167			
5544	C ₂₀ H ₂₂ ClNO ₄	Papaverine hydrochloride.....	375.64	221 d.			
5545	C ₂₀ H ₂₂ N ₂ O	Quinene.....	306.19	82			
5546	C ₂₀ H ₂₂ N ₂ O ₂	Dehydroquinine.....	322.19	181			
5547	C ₂₀ H ₂₂ N ₂ O ₂	Jelsemine.....	322.19	178			
5548	C ₂₀ H ₂₂ N ₂ O ₄	Lysuric acid.....	354.19	145			
5549	C ₂₀ H ₂₃ O ₃	Populin.....	390.17	180			
5550	C ₂₀ H ₂₃ ClN ₂ O ₂	Jelsemine hydrochloride.....	358.65	300			
5551	C ₂₀ H ₂₃ NO ₄	Acetylcodeine.....	341.19	133.5			
5552	C ₂₀ H ₂₃ NO ₄	Corypalmine.....	341.19	236			
5553	C ₂₀ H ₂₃ N ₂ O ₄	Pyramidon salicylate.....	369.20	70			
5554	C ₂₀ H ₂₃ O ₄	Naphthyl acid camphorate.....	327.18	122			
5555	C ₂₀ H ₂₄ Cl ₂ N ₂ O ₂	Quinene dichloride.....	395.12	97			
5556	C ₂₀ H ₂₄ NO ₄	Staphisagrine.....	342.19	275			
5557	C ₂₀ H ₂₄ N ₂ O	Desoxyquinine.....	308.20	52			
5558	C ₂₀ H ₂₄ N ₂ O ₂	Isoconquinine.....	324.20	142			
5559	C ₂₀ H ₂₄ N ₂ O ₂	Isoquinine.....	324.20	185			
5560	C ₂₀ H ₂₄ N ₂ O ₂	Quinicine.....	324.20	60			
5561	C ₂₀ H ₂₄ N ₂ O ₂	Quinidine.....	324.20	168			1298
5562	C ₂₀ H ₂₄ N ₂ O ₂	Quinine.....	324.20	175			1279
5563	C ₂₀ H ₂₄ N ₂ O ₂	Quinine (isomer A).....	324.20	193.5			
5564	C ₂₀ H ₂₄ N ₂ O ₂	Quinine (isomer B).....	324.20	189			
5566	C ₂₀ H ₂₅ BrN ₂ O ₂	Quinine hydrobromide.....	405.13	200			
5567	C ₂₀ H ₂₅ ClN ₂ O ₂	Quinidine hydrochloride.....	360.67	259 d.			
5568	C ₂₀ H ₂₅ ClN ₂ O ₂	Quinine hydrochloride.....	360.67	160	259 d.		
5570	C ₂₀ H ₂₅ NO ₂	Lobelidine.....	311.20	106			
5571	C ₂₀ H ₂₅ NO ₄	Codamine.....	343.20	121			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5572	C ₂₀ H ₂₂ NO ₄	Laudanidine.....	343.20	177			
5573	C ₂₀ H ₂₂ NO ₄	Laudanine.....	343.20	164.5		1.256	
5575	C ₂₀ H ₂₂ N ₂ O ₆ S	Quinine disulfate.....	422.28	160 d.			
5577	C ₂₀ H ₂₄ N ₂ O ₂	Hydroquinidine.....	326.22	167			
5578	C ₂₀ H ₂₄ N ₂ O ₂	Hydroquinine.....	326.22	172.3			
5579	C ₂₀ H ₂₇ NO ₆	Diversine.....	361.22	93			
5580	C ₂₀ H ₂₇ NO ₁₁	Amygdalin.....	457.22	200			
5581	C ₂₀ H ₂₇ N ₂ O ₄ P	Quinine hypophosphite.....	390.25	181			
5583	C ₂₀ H ₂₈ O ₄	Thymyl acid camphorate.....	332.22	89			
5584	C ₂₀ H ₂₈ O ₆	Eugenol acid camphorate.....	348.22	116			
5585	C ₂₀ H ₂₈ O ₆	Cholanic acid.....	364.22	285			
5586	C ₂₀ H ₂₈ O ₁₂	Primeverin.....	476.22	206			
5587	C ₂₀ H ₃₀ N ₂ O ₅	Quinine hydrate.....	378.25	57	d.		
5588	C ₂₀ H ₃₀ O ₂	d-Pimaric acid.....	302.23	212	282 ²⁰		
5589	C ₂₀ H ₃₀ O ₄	Onoceric acid.....	334.23	120			
5590	C ₂₀ H ₃₀ O ₅	Andrographolide.....	350.23	218			
5591	C ₂₀ H ₃₂ O ₆	Andrographolic acid.....	368.25	188			
5592	C ₂₀ H ₃₂ NO	Myristic anilide.....	303.26	84			
5593	C ₂₀ H ₃₂ N ₂	Ormosine.....	315.28	87			
5594	C ₂₀ H ₃₂ N ₂	Ormosinine.....	315.28	205			
5595	C ₂₀ H ₃₄ O	Ambrosterol.....	290.26	147			
5596	C ₂₀ H ₃₄ O	Cinchol.....	290.26	139			
5597	C ₂₀ H ₃₄ O	Cupreol.....	290.26	140			
5598	C ₂₀ H ₃₄ O	Quebrachol.....	290.26	125			
5599	C ₂₀ H ₃₄ O ₁₀	Cyclamin.....	434.26	236			1333
5600	C ₂₀ H ₃₆ N ₂ O ₁₆	Vicine.....	628.34	242 d.			
5601	C ₂₀ H ₃₆ O	Excretin.....	292.28	96			
5602	C ₂₀ H ₃₆ O ₂	Eicosinic acid.....	308.28	69	270 ¹⁵		
5603	C ₂₀ H ₃₆ O ₂	Ethyl chaulmoograte.....	308.28		230 ²⁰	0.906	1036
5604	C ₂₀ H ₃₈ O ₂	Eicosenic acid.....	310.29	50	267 ¹⁵		
5605	C ₂₀ H ₃₈ O ₂	Ethyl ricinoleate.....	326.29		258 ¹⁵	0.914	481
5606	C ₂₀ H ₄₀ O	Phytol.....	296.31		204 ¹⁰	0.856	484
5607	C ₂₀ H ₄₀ O ₂	Arachidic acid.....	312.31	77	328		
5608	C ₂₀ H ₄₀ O ₂	Ethyl stearate C ₁₇ H ₃₅ CO ₂ C ₂ H ₅	312.31	33.7	224		
5609	C ₂₀ H ₄₁ I	n-Eicosyl iodide.....	408.25	42	192 ^{5,6}		
5610	C ₂₀ H ₄₂	n-Eicosane CH ₃ (CH ₂) ₁₈ CH ₃	282.32	38	205 ¹⁵	0.778 ^{25,7}	1065
5611	C ₂₀ H ₄₂ O	Eicosyl alcohol CH ₃ (CH ₂) ₁₈ CH ₂ OH.....	298.32	71	220 ³		
5612	C ₂₁ H ₄₄ O	α, β'-Dinaphthyl ketone.....	282.11	135			
5613	C ₂₁ H ₄₄ O	β, β'-Dinaphthyl ketone.....	282.11	a 125.5 b 164.5			
5614	C ₂₁ H ₄₄ O ₂	Picenic acid.....	298.11	201			
5615	C ₂₁ H ₄₄ Bi ₂ O ₉	Bismuth salicylate.....	829.12	135 d.			
5616	C ₂₁ H ₄₆	α, α'-Dinaphthylmethane.....	268.12	109	360		
5617	C ₂₁ H ₄₆	α, β'-Dinaphthylmethane (C ₁₀ H ₇) ₂ CH ₂	268.12	95			
5618	C ₂₁ H ₄₆	β, β'-Dinaphthylmethane (C ₁₀ H ₇) ₂ CH ₂	268.12	93			
5619	C ₂₁ H ₄₆ N ₂	Lophine.....	296.14	275			
5620	C ₂₁ H ₄₆ O ₁₁	Methylenecitrylsalicylic acid.....	444.12	154			
5621	C ₂₁ H ₄₈ N ₂	Amarin.....	298.16	129			
5622	C ₂₁ H ₄₈ N ₂	Hydrobenzamide.....	298.16	101			
5623	C ₂₁ H ₄₈ O ₁₂	Scutellarin.....	462.14	200 d.			
5624	C ₂₁ H ₄₈ NO ₄	Fumarine.....	349.15	199			
5625	C ₂₁ H ₅₀	Phenylditolylmethane.....	272.15	56			
5626	C ₂₁ H ₅₀ N ₂ O ₄	Alstonine (Chlorogenine).....	364.17	195			
5627	C ₂₁ H ₅₀ O ₆	Curcumin.....	368.15	183			1333
5628	C ₂₁ H ₅₀ O ₉	Aloin.....	416.15	147.9			
5629	C ₂₁ H ₅₀ O ₉	1, 2-Dihydro-3, 5-dihydroxy-4-(α, 3, 4-trihydroxybenzylbenzofuran)*.....	416.15	217			
5630	C ₂₁ H ₅₀ O ₉	Frangulin.....	416.15	226			
5631	C ₂₁ H ₅₀ O ₁₁	Quercitrin.....	448.15	185			
5632	C ₂₁ H ₅₀ O ₁₂	Incarnatin.....	464.15	245			
5633	C ₂₁ H ₅₁ N	Tribenzylamine (C ₆ H ₅ CH ₂) ₃ N.....	287.17	92		0.991 ²⁵	
5634	C ₂₂ H ₅₁ NO ₆	d-Coreycavamine.....	367.17	149			
5635	C ₂₁ H ₅₁ NO ₆	Hydrastine.....	383.17	132			

* Also commonly known as Catechol, Pyrocatechol, Catechin, Pyrocatechin. See #1414.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5636	C ₂₁ H ₂₁ NO ₆	Rhoeadine.....	383.17	232 d.			
5637	C ₂₁ H ₂₁ N ₃	Anhydroformaldehydeaniline.....	315.19	45.5	185		
5638	C ₂₁ H ₂₁ O ₄ P	Tri- <i>p</i> -cresyl phosphate.....	368.19	77			
5639	C ₂₁ H ₂₁ O ₄ P	Triguaiacyl phosphite.....	400.19	78			
5640	C ₂₁ H ₂₁ O ₇ P	Triguaiacyl phosphate.....	416.19	98			
5641	C ₂₁ H ₂₃ N ₃ O ₂	Isostrychnine.....	334.19	214.5			
5642	C ₂₁ H ₂₃ N ₃ O ₂	Strychnine.....	334.19	268	270 ⁵	1.359 ¹⁸	
5645	C ₂₁ H ₂₃ Cl ₂ N ₃ O ₃	Benzamide hydrochloride.....	436.12	178			
5646	C ₂₁ H ₂₃ NO ₄	Meconidine.....	353.19	58			
5647	C ₂₁ H ₂₃ NO ₆	Cryptopine.....	369.19	218		1.351	
5648	C ₂₁ H ₂₃ NO ₆	Diacetylmorphine.....	369.19	172			1260
5649	C ₂₁ H ₂₃ NO ₆	α-Homochelidonine.....	369.19	182			
5650	C ₂₁ H ₂₃ NO ₆	β-Homochelidonine.....	369.19	159			
5651	C ₂₁ H ₂₃ NO ₆	γ-Homochelidonine.....	369.19	171			
5652	C ₂₁ H ₂₃ NO ₆	Colchicine.....	385.19	172			
5653	C ₂₁ H ₂₃ N ₃ O ₃	Strychnine nitrate.....	397.20				1333
5654	C ₂₁ H ₂₄ ClNO ₄	Diacetylmorphine hydrochloride.....	405.65	230			
5655	C ₂₁ H ₂₄ N ₂ O	Paytine.....	320.20	156			
5656	C ₂₁ H ₂₄ N ₂ O	Strychnidine.....	320.20	250.5	295 ¹⁴		
5657	C ₂₁ H ₂₄ N ₆ O ₁₀	Geneserine picrate.....	520.23	175			
5658	C ₂₁ H ₂₄ O ₈	Glycyphylline.....	420.19	180			
5659	C ₂₁ H ₂₄ O ₁₀	Phloridzin.....	436.19	170 d.		1.430	
5660	C ₂₁ H ₂₄ O ₁₁	Datiscin.....	452.19	180			
5661	C ₂₁ H ₂₄ O ₁₂	Saponarin.....	468.19	232			
5663	C ₂₁ H ₂₅ NO ₄	Corybulbine.....	355.20	239			
5664	C ₂₁ H ₂₅ NO ₄	Corydine.....	355.20	105			1165
5665	C ₂₁ H ₂₅ NO ₄	Glaucone.....	355.20	120			
5666	C ₂₁ H ₂₅ NO ₄	Isocorybulbine.....	355.20	180			
5667	C ₂₁ H ₂₅ N ₃ O ₂	Porphyrine.....	351.22	97			
5668	C ₂₁ H ₂₅ N ₃ O	Desoxystrychnine.....	322.22	172			
5669	C ₂₁ H ₂₅ N ₃ O ₃	Corynanthine.....	354.22	242			
5670	C ₂₁ H ₂₅ N ₃ O ₃	Quebrachine.....	354.22	248			1333
5671	C ₂₁ H ₂₅ N ₃ O ₄	Quinine formate.....	370.22	113			
5672	C ₂₁ H ₂₇ ClN ₂ O ₃	Quebrachine hydrochloride.....	390.68	290			
5673	C ₂₁ H ₂₇ NO ₄	<i>d</i> (<i>l</i>)-Laudanosine.....	357.22	89			
5674	C ₂₁ H ₂₇ NO ₁₀	<i>d</i> -Cocaine bitartrate.....	453.22	112			
5675	C ₂₁ H ₂₈ N ₂ O	Tetraethylidiaminobenzophenone.....	324.23	96			
5676	C ₂₁ H ₂₈ O ₄	Marrubiin.....	344.22	154.5	297 ¹⁵		
5677	C ₂₁ H ₃₀ N ₂ O ₄	Struxine.....	374.25	250 d.			
5678	C ₂₁ H ₃₀ O ₂	Cannabinol.....	314.23		315 ¹⁰⁰	1.042 ¹⁸	
5679	C ₂₁ H ₃₀ O ₄	Euonymol.....	346.23	250			
5680	C ₂₁ H ₃₀ O ₈	Antiarin.....	410.23	215			
5681	C ₂₁ H ₃₄ O	Pyrethrol.....	302.27	199	290		
5682	C ₂₁ H ₃₄ O ₂	Benzyl myristate C ₁₉ H ₃₇ CO ₂ CH ₂ C ₆ H ₅ ...	318.26	20.5	231 ¹¹	0.932 ¹⁵	536
5683	C ₂₁ H ₃₄ O ₃	<i>Di-d</i> -bornyl carbonate.....	334.26	216			
5684	C ₂₁ H ₃₄ O ₄	Ipurganol.....	350.26	225			
5685	C ₂₁ H ₃₄ O ₁₀	Helleborein.....	446.26	230 d.			
5686	C ₂₁ H ₃₆ O ₄	Trifolialol.....	352.28	300			
5687	C ₂₁ H ₃₈ O ₃	<i>Di-L</i> -menthyl carbonate.....	338.29	106			
5688	C ₂₁ H ₃₈ O ₆	Tricaproin.....	386.29	-25		0.988	392
5689	C ₂₁ H ₄₀ O ₂	Dimenthoformal.....	324.31	57	337		
5690	C ₂₁ H ₄₂	9-Heneicosene C ₉ H ₁₇ CH:CHC ₁₁ H ₂₃	294.32	3	202 ¹¹	0.805 ¹⁵	
5691	C ₂₁ H ₄₂ O ₂	Cluytinic acid.....	326.32	69			
5692	C ₂₁ H ₄₂ O ₃	Heneicosonic acid CH ₃ (CH ₂) ₁₉ CO ₂ H.....	326.32	74			
5693	C ₂₁ H ₄₂ NO	Heneicosamide CH ₃ (CH ₂) ₁₉ CONH ₂	325.34	110			
5694	C ₂₁ H ₄₄	<i>n</i> -Heneicosane CH ₃ (CH ₂) ₁₉ CH ₃	296.34	40.4	215 ¹⁵	0.775 ^{46, 3}	1067
5695	C ₂₂ H ₄₄	Picene.....	278.11	364	520		
5696	C ₂₂ H ₄₄ N ₂ O	Rosindon (Rosindulon).....	322.12	262			
5697	C ₂₂ H ₄₄ NO ₆	Colchicine.....	389.12	146			
5698	C ₂₂ H ₄₄ N ₂	Rosinduline.....	321.14	199			
5699	C ₂₂ H ₄₆ O ₄	α-Cresolphthalein.....	346.14	216			
5700	C ₂₂ H ₄₀ O ₁₈	Carminic acid.....	492.15	136 d.			
5701	C ₂₂ H ₄₂ O ₁₁	Isotrifolin.....	462.17	250			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5702	C ₂₂ H ₃₂ O ₁₁	Trifolin.....	462.17	260			
5703	C ₂₂ H ₃₂ NO ₇	Gnoscopine.....	413.19	233			
5704	C ₂₂ H ₂₂ NO ₇	Narcotine.....	413.19	175		1.374	
5705	C ₂₂ H ₂₂ N ₂ O ₇	Pyrene picrate.....	431.12	218			
5706	C ₂₂ H ₂₄ O ₁₀	Sakuranin.....	448.19	212			
5707	C ₂₂ H ₂₄ NO ₄	Corycavidine.....	367.20	213			
5708	C ₂₂ H ₂₄ NO ₆	<i>l</i> -Colchicine.....	399.20	146			1333
5709	C ₂₂ H ₂₆ N ₂ O ₂	Apoyohimbine.....	350.22	252			
5710	C ₂₂ H ₂₆ N ₂ O ₃	Acetylquinine.....	366.22	108			
5711	C ₂₂ H ₂₆ N ₂ O ₃	Gelsemine.....	366.22	178			
5712	C ₂₂ H ₂₆ N ₂ O ₄	Chaimaridine.....	382.22	128			
5713	C ₂₂ H ₂₆ N ₂ O ₄	Chaimarine.....	382.22	233			
5714	C ₂₂ H ₂₆ N ₂ O ₄	Conchaimarine.....	382.22	120			
5715	C ₂₂ H ₂₆ N ₂ O ₄	Conchairamidine.....	382.22	115			
5716	C ₂₂ H ₂₆ N ₂ O ₄	Mitraversine.....	382.22	237			
5718	C ₂₂ H ₂₆ O ₁₂	Hesperidin.....	482.20	171	251 d.		
5719	C ₂₂ H ₂₇ AsNO ₅	Strychnine methylarsinate.....	460.18	60 d.			
5720	C ₂₂ H ₂₇ BrN ₂ O ₃	Gelseminine hydrobromide.....	447.14				1333
5721	C ₂₂ H ₂₇ ClN ₂ O ₂	Apoyohimbine hydrochloride.....	386.68	300			
5722	C ₂₂ H ₂₇ ClN ₂ O ₃	Gelseminine hydrochloride.....	402.68	330			1333
5723	C ₂₂ H ₂₇ NO ₄	<i>dl</i> -Corydaline.....	369.22	136			
5724	C ₂₂ H ₂₇ N ₂ O ₃	Physostigmine salicylate.....	413.23	178.9			1333
5725	C ₂₂ H ₂₈ N ₂ O ₂	Aspidosamine.....	352.23	100			
5726	C ₂₂ H ₂₈ N ₂ O ₂	Aspidospermatine.....	352.23	162			
5727	C ₂₂ H ₂₈ N ₂ O ₄	Ditaine (Echitamine).....	384.23	206			1333
5728	C ₂₂ H ₂₈ N ₂ O ₄	Quinine acetate.....	384.23	126			
5729	C ₂₂ H ₂₈ N ₄	Camphorosazone.....	348.25	55			
5730	C ₂₂ H ₂₈ O ₃	Santaly salicylate.....	340.22		126.6 ²⁰	1.070 ¹⁸	
5732	C ₂₂ H ₂₉ IO ₂	Europen (Diisobutyl- <i>p</i> -cresol iodide).....	452.16	110			
5733	C ₂₂ H ₃₀ N ₂ O ₂	Aspidospermine.....	354.25	208	220 ²		
5734	C ₂₂ H ₃₁ NO ₅ (?)	Mitragynine.....	389.25	106	240 ⁶		
5735	C ₂₂ H ₃₂ O ₃	Anacardic acid.....	344.25	26			
5736	C ₂₂ H ₃₂ O ₄	Digitoxigenin.....	360.25	230			
5737	C ₂₂ H ₃₂ O ₅	Genin.....	392.25	206			
5738	C ₂₂ H ₃₂ NO ₄	Atropine isovalerate.....	391.26	32			
5739	C ₂₂ H ₃₂ NO ₄	Atropine valerate.....	391.26	42			1333
5741	C ₂₂ H ₃₄ N ₂ O ₅ S	Pilocarpine sulfate.....	514.36	132			1333
5742	C ₂₂ H ₃₄ NO ₆	Delphinine.....	409.28	187.5			
5743	C ₂₂ H ₃₄ O ₄	Bryonol.....	364.28	212			
5744	C ₂₂ H ₃₄ O ₅	Capsularin.....	428.28	176			
5745	C ₂₂ H ₃₇ NO	Palmitic anilide.....	331.29	90.5	284 ¹⁷		
5746	C ₂₂ H ₃₈ O	Cholestol.....	318.29	139	360		
5747	C ₂₂ H ₃₈ O	Ilcyl alcohol.....	318.29	175	350		
5748	C ₂₂ H ₃₈ O ₄	Citrullol.....	366.29	290			
5759	C ₂₂ H ₃₈ O ₄	Di- <i>l</i> -menthyl oxalate.....	366.29	68	225 ¹²		
5760	C ₂₂ H ₃₉ ClO	Behenolyl chloride C ₂₁ H ₃₉ COCl.....	354.76	29			
5761	C ₂₂ H ₄₀ O ₂	Behenolic acid C ₂₁ H ₃₉ CO ₂ H.....	336.31	57.5			
5762	C ₂₂ H ₄₁ NO	Behenolyl amide C ₂₁ H ₃₉ CONH ₂	335.32	90			
5763	C ₂₂ H ₄₂ O ₂	Brassicidic acid.....	338.32	61.5	282 ³⁰	0.859 ^{57.1}	1085
5764	C ₂₂ H ₄₂ O ₂	Erucic acid.....	338.32	33.5	281 ³⁰	0.860 ^{58.4}	
5765	C ₂₂ H ₄₂ O ₃	14-Ketobehenic acid.....	354.32	84			
5765.1	C ₂₂ H ₄₂ O ₃	Isobutyl ricinoleate.....	354.32		262 ⁹	0.903 ²²	980
5766	C ₂₂ H ₄₃ NO	Erucamide C ₂₁ H ₄₁ CONH ₂	337.34	83			
5767	C ₂₂ H ₄₄ O	Erucyl alcohol.....	324.34	34.6	200 ^{0.2}		
5768	C ₂₂ H ₄₄ O ₃	Behenic acid.....	340.34	84	306 ⁶⁰		
5769	C ₂₂ H ₄₄ O ₂	Methyl heneicosate C ₂₀ H ₄₁ CO ₂ CH ₃	340.34	49			
5770	C ₂₂ H ₄₅ I	Docosyl iodide CH ₃ (CH ₂) ₂₀ CH ₂ I.....	436.28	49			
5771	C ₂₂ H ₄₅ NO	Behenamide C ₂₁ H ₄₃ CONH ₂	339.36	112			
5772	C ₂₂ H ₄₆	<i>n</i> -Docosane CH ₃ (CH ₂) ₂₀ CH ₃	310.35	44.4	224.5 ¹⁵	0.778 ^{44.4}	
5773	C ₂₂ H ₄₆ O	Docosyl alcohol CH ₃ (CH ₂) ₂₀ CH ₂ OH.....	326.35	74			
5774	C ₂₂ H ₂₀ O ₃	Amaric anhydride.....	328.15	140.5			
5775	C ₂₂ H ₂₂ NO ₆	Corycavine.....	409.19	216			
5776	C ₂₂ H ₂₄ N ₂ O ₆	Buphnatine.....	424.20	240			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5777	C ₂₃ H ₂₄ N ₄ O ₂	Methylenedianthipyrine.....	388.22	177			
5778	C ₂₃ H ₂₄ N ₄ O ₁₁	Hyoscine picrate.....	532.22	188			
5779	C ₂₃ H ₂₄ O ₃	<i>o</i> -Cresol orthoacetate.....	348.19	89			
5780	C ₂₃ H ₂₄ O ₉	Picropodophyllin.....	444.19	227			
5781	C ₂₃ H ₂₄ O ₉	Podophyllotoxin.....	444.19	94			
5782	C ₂₃ H ₂₃ NO ₄	Lanthopine.....	379.20	200			
5783	C ₂₃ H ₂₆ ClN ₂ O ₃	Acoin.....	427.68	178			
5784	C ₂₃ H ₂₆ N ₂ O ₄	Aricine.....	394.22	188 d.			
5785	C ₂₃ H ₂₆ N ₂ O ₄	Brucine.....	394.22	178			
5786	C ₂₃ H ₂₆ N ₂ O ₄	Concusconine.....	394.22	208			
5787	C ₂₃ H ₂₆ N ₂ O ₄	Cusconine.....	394.22	110			
5788	C ₂₃ H ₂₆ N ₂ O ₅	Allobrucine oxide.....	410.22	189			
5789	C ₂₃ H ₂₇ NO ₆	Homoatropine salicylate.....	413.22				1333
5790	C ₂₃ H ₂₇ NO ₆	Narceine.....	445.22	170			
5791	C ₂₃ H ₂₇ N ₂ O ₇	Brucine nitrate.....	457.23	230 d.			
5792	C ₂₃ H ₂₈ ClNO ₅	Narceine hydrochloride.....	481.68	192			1333
5793	C ₂₃ H ₂₈ N ₂ O ₄	Vellosine.....	396.23	189 d.			
5794	C ₂₃ H ₂₉ NO ₂	Lobeline.....	351.23	131			
5795	C ₂₃ H ₃₀ N ₂ O ₄	Quinine propionate.....	398.25	111			
5796	C ₂₃ H ₃₀ N ₂ O ₅	<i>d</i> -Quinine lactate.....	414.25	165.5			
5797	C ₂₃ H ₃₀ N ₂ O ₅	<i>d</i> -Quinine lactate.....	414.25	175			
5798	C ₂₃ H ₃₀ N ₂ O ₅	<i>l</i> -Quinine lactate.....	414.25	171			
5799	C ₂₃ H ₃₁ NO ₂	Atisine.....	353.25	85			
5801	C ₂₃ H ₃₂ N ₂ O ₄	Quinine ethyl carbonate (Equinine).....	401.27	91			
5802	C ₂₃ H ₃₂ N ₂ O ₅	Pyramidon acid camphorate.....	431.28	94			
5803	C ₂₃ H ₃₆ O ₂	Lactucon (Lactuol acetate).....	344.28	184			
5804	C ₂₃ H ₃₆ O ₄	Calabarol.....	376.28	245			
5804.1	C ₂₃ H ₃₈ N ₂	Conessine.....	342.31	125			1333
5805	C ₂₃ H ₃₈ O ₂	Benzyl palmitate.....	346.29	36		0.914 ₂₅	1079
5806	C ₂₃ H ₃₈ O ₄	Anonol.....	378.29	298			
5807	C ₂₃ H ₃₈ O ₄	Grindelol (Phytosterol glucoside).....	378.29	257			
5808	C ₂₃ H ₄₀ O	Ambrein.....	332.31	82			
5809	C ₂₃ H ₄₀ O	Xanthosterin.....	332.31	214			
5810	C ₂₃ H ₄₀ O ₄	Di- <i>l</i> -menthyl malonate.....	380.31	62	170 ¹	0.944 ₄ ⁶	
5811	C ₂₃ H ₄₀ O ₄	Ipuranol.....	380.31	290			
5812	C ₂₃ H ₄₂ O ₂	Methyl behenolate C ₂₁ H ₃₉ CO ₂ CH ₃	350.32	22			
5813	C ₂₃ H ₄₄ O ₂	Methyl erucate C ₂₁ H ₄₁ CO ₂ CH ₃	352.34		222 ¹	0.870	457
5814	C ₂₃ H ₄₆ O	Laurone (C ₁₁ H ₂₃) ₂ CO.....	338.35	69		0.789 ₄ ^{9.9}	1111
5815	C ₂₃ H ₄₆ O ₃	Methyl behenate C ₂₁ H ₄₃ CO ₂ CH ₃	354.35	54.5	225		
5816	C ₂₃ H ₄₈	<i>n</i> -Tricosane CH ₃ (CH ₂) ₂₁ CH ₃	324.37	47.7	320.7	0.779 ₄ ^{17.7}	1120
5817	C ₂₄ H ₁₆	Crackene.....	306.14	308	500		
5818	C ₂₄ H ₁₈	1, 3, 5-Triphenylbenzene.....	306.14	170		1.206	1317
5819	C ₂₄ H ₁₈ As ₂ N ₂ O	Phenarsazine oxide.....	500.08	350			
5820	C ₂₄ H ₁₈ N ₂	<i>p</i> , <i>p'</i> -Diphenylazobenzene.....	334.16	250			
5821	C ₂₄ H ₁₈ N ₂ O	<i>p</i> , <i>p'</i> -Diphenylazoxybenzene.....	350.16	205			
5822	C ₂₄ H ₂₀ N ₂	<i>p</i> , <i>p'</i> -Diphenylhydrazobenzene.....	336.17	247			
5823	C ₂₄ H ₂₀ O ₆	Glycerol tribenzoate.....	404.15	76.5			
5824	C ₂₄ H ₂₀ O ₉	Glycerol trisalicylate.....	452.15	79			
5826	C ₂₄ H ₂₈ N ₂ O	Benzoylauramine.....	371.22	179			
5829	C ₂₄ H ₂₈ O ₆	Diguaiacyl camphorate.....	412.22	124			
5830	C ₂₄ H ₂₈ O ₈	<i>α</i> -Flavaspidic acid.....	444.22	92			
5831	C ₂₄ H ₂₈ O ₈	<i>β</i> -Flavaspidic acid.....	444.22	156			
5832	C ₂₄ H ₂₉ NO ₆	Atropine salicylate.....	427.23				1333
5834	C ₂₄ H ₃₀ O ₆	Elaterone.....	398.23	300			
5835	C ₂₄ H ₃₀ O ₇	Anthamantin.....	430.23	79			
5836	C ₂₄ H ₃₀ O ₁₈	Scopolin.....	558.23	218			
5837	C ₂₄ H ₃₂ N ₂ O ₄	Quinine butyrate.....	412.26	77.5			
5838	C ₂₄ H ₃₂ N ₄ O ₉	Maltosazone.....	520.28	206			
5839	C ₂₄ H ₃₂ N ₂ O	Holarrhenine.....	370.31	198			
5840	C ₂₄ H ₃₈ O ₄	Di- <i>d</i> -bornyl succinate.....	390.29	83.7			
5841	C ₂₄ H ₄₀ N ₂	Conessine.....	356.32	125			
5842	C ₂₄ H ₄₀ O ₄	Choleic acid.....	392.31	190			
5843	C ₂₄ H ₄₀ O ₄	Cucurbitol.....	392.31	260			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5844	C ₂₄ H ₄₀ O ₆	Cholic acid.....	408.31	195			
5845	C ₂₄ H ₄₁ NO	Stearic anilide CH ₃ (CH ₂) ₁₈ CONHC ₆ H ₅	359.32	93.6			
5846	C ₂₄ H ₄₂ O ₄	Di- <i>L</i> -menthyl succinate.....	394.32	63	220 d.	0.947 ₄ ⁷¹	
5847	C ₂₄ H ₄₂ O ₄	Di- <i>L</i> -menthyl <i>d</i> -tartrate.....	426.32	75		1.054	
5848	C ₂₄ H ₄₂ O ₄	Di- <i>L</i> -menthyl <i>L</i> -tartrate.....	426.32	42		1.045 ¹⁶	
5849	C ₂₄ H ₄₄ O ₆	Lithofellinic acid.....	412.34	206			
5850	C ₂₄ H ₄₄ I ₂ O ₂	Ethyl diiodobrassidate.....	618.20	37			
5851	C ₂₄ H ₄₄ O ₂	Ethyl behenolate C ₂₁ H ₄₃ CO ₂ C ₂ H ₅	364.34	15			
5852	C ₂₄ H ₄₆ O ₂	Ethyl brassidate.....	366.35	30.5			1046
5853	C ₂₄ H ₄₆ O ₂	Ethyl erucate C ₂₁ H ₄₁ CO ₂ C ₂ H ₅	366.35		230	0.865	449
5854	C ₂₄ H ₄₆ O ₂	Carnaubic acid.....	368.37	72			
5855	C ₂₄ H ₄₆ O ₂	Lignoceric acid C ₂₂ H ₄₄ CO ₂ H.....	368.37	81			
5856	C ₂₄ H ₄₆ O ₂	Paraffinic acid C ₂₂ H ₄₄ CO ₂ H.....	368.37	46			
5857	C ₂₄ H ₄₆ O ₂	Pisangcrylic acid C ₂₂ H ₄₂ CO ₂ H.....	368.37	72			
5858	C ₂₄ H ₄₆ O ₂	Tetraconic acid CH ₃ (CH ₂) ₂₂ CO ₂ H.....	368.37	85.5			
5859	C ₂₄ H ₄₈ O ₂	Ethyl behenate C ₂₁ H ₄₃ CO ₂ C ₂ H ₅	368.37	50.5	231		
5860	C ₂₄ H ₄₈	Isotetracosane.....	338.39	51	243 ¹⁵		
5861	C ₂₄ H ₄₈	<i>n</i> -Tetracosane CH ₃ (CH ₂) ₂₂ CH ₃	338.39	54	324.1	0.779 ₄ ^{11,1}	
5862	C ₂₄ H ₄₈ O	Carnaubyl alcohol C ₂₄ H ₄₈ OH.....	354.39	69			
5863	C ₂₄ H ₂₀	Tetraphenylmethane C(C ₆ H ₅) ₄	320.15	285	431		
5864	C ₂₄ H ₂₁ N ₃	Tetraphenylguanidine.....	363.19	131			
5865	C ₂₄ H ₂₈ O ₁₁	Ononin.....	502.20	210			
5866	C ₂₄ H ₂₈ O ₁₄	Gentiin.....	552.22	274			
5867	C ₂₄ H ₂₉ NO ₈ S	Codeine <i>o</i> -guaiacolsulfonate.....	503.30	165			
5868	C ₂₄ H ₃₂ O ₈	Albaspidin.....	460.25	147			
5869	C ₂₄ H ₃₂ O ₈	Aspidin.....	460.25	124			
5871	C ₂₄ H ₃₄ O ₁₄	Loganin.....	558.26	215			
5872	C ₂₄ H ₃₉ NO ₈	Pseudoaconine.....	481.31	95			
5873	C ₂₄ H ₄₀ O	Fungisterin.....	356.31	144			
5874	C ₂₄ H ₄₀ O	Homotaraxasterol.....	356.31	164			
5875	C ₂₄ H ₄₀ O ₃	Benzyl oleate.....	372.31		237 ⁷	0.933 ₂₅ ²⁵	1024
5876	C ₂₄ H ₄₂ O ₂	Benzyl stearate C ₁₇ H ₃₅ CO ₂ CH ₂ C ₆ H ₅	374.32	45.8		0.908 ₂₅ ²⁰	1078
5877	C ₂₄ H ₄₄ O ₄	Di- <i>L</i> -menthyl glutarate.....	408.34		243 ²⁰		
5878	C ₂₄ H ₄₆ O ₂	Neocerotic acid.....	382.39	77.8			
5879	C ₂₄ H ₄₆ O ₂	Hyenic acid.....	382.39	78			
5880	C ₂₄ H ₄₆ O ₃	Cerebronic acid.....	398.39	100			
5881	C ₂₄ H ₄₈	Pentacosane CH ₃ (CH ₂) ₂₂ CH ₃	352.40	54	284 ⁴⁰	0.779	
5882	C ₂₄ H ₁₄	Rubicene.....	326.11	306			
5883	C ₂₄ H ₂₀	Tetraphenylethylene.....	332.15	221	425		
5884	C ₂₄ H ₂₀ O	α -Benzopinacoline.....	348.15	205			
5885	C ₂₄ H ₂₀ O	β -Benzopinacoline.....	348.15	181			
5886	C ₂₄ H ₂₁ NO ₁₁	Aconine.....	523.17	132			
5887	C ₂₄ H ₂₂	1, 1, 2, 2-Tetraphenylethane.....	334.17	209	383	1.182	
5888	C ₂₄ H ₂₂ N ₄	Benzilosazone.....	390.20	225			
5889	C ₂₄ H ₂₂ O ₂	Benzopinacone.....	366.17	186 d.			
5890	C ₂₄ H ₂₃ N ₅	Tetraphenyldiguanidine.....	405.22	136			
5891	C ₂₄ H ₂₄ N ₂ O ₃	Benzoylcinchonine.....	398.22	106			
5892	C ₂₄ H ₂₇ ClN ₂ O ₂	Benzoylcinchonine hydrochloride.....	434.68	207			
5893	C ₂₄ H ₂₈ N ₂ O ₄	Cinchonidine salicylate.....	432.23	70			
5895	C ₂₄ H ₂₈ O ₁₄	Ruberythric acid.....	564.22	260			
5896	C ₂₄ H ₂₈ O ₁₄	Morindin.....	564.22	245	247		
5897	C ₂₄ H ₃₀ N ₂ O ₈ S	Quinine phenolsulfonate.....	498.31				1333
5898	C ₂₄ H ₃₀ O ₄	Bixin.....	406.23	189			
5899	C ₂₄ H ₃₂ N ₂ O ₂	Ibogine.....	404.26	152			
5900	C ₂₄ H ₃₇ NO ₃	Jervine.....	411.29	241			
5901	C ₂₄ H ₃₈	Carotin.....	350.29	167.8			
5902	C ₂₄ H ₄₀ O	Ergosterin.....	368.31	154	185 ²⁰	1.040	
5903	C ₂₄ H ₄₀ O ₇	Laserpitin.....	464.31	117.5	240 ¹⁰ d.		
5904	C ₂₄ H ₄₁ NO ₁₀	Japaconine.....	527.32	97			
5905	C ₂₄ H ₄₂ O ₃	Sarsasapogenin.....	402.32	183			
5906	C ₂₄ H ₄₂ O ₃	Smilacin.....	402.32	160 d.			
5907	C ₂₄ H ₄₃ NO ₂	Rubijervine.....	401.34	236			
5908	C ₂₄ H ₄₃ NO ₆	Glycocholic acid.....	465.34	134			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5909	C ₂₆ H ₄₄ O	Caulosterol	372.34	159			
5910	C ₂₆ H ₄₄ O ₂	Onocerin	388.34	232			
5911	C ₂₆ H ₄₄ O ₄	Gitogenin	420.34	272			
5912	C ₂₆ H ₄₄ O ₁₀	Parillin	516.34	176.1			
5913	C ₂₆ H ₄₆ NO ₈	Protoveratridine	499.36	265			
5914	C ₂₆ H ₄₆ O	Mochyl alcohol C ₂₆ H ₄₆ OH	374.35	234			
5915	C ₂₆ H ₄₆ O ₄	Di- <i>L</i> -menthyl adipate	422.35	61			
5916	C ₂₆ H ₅₂ O ₂	Cerotic acid	396.40	82.5		0.836 ₄ ⁷⁹	
5917	C ₂₆ H ₅₂ O ₂	Ethyl lignocerate	396.40	56	310 ²⁰		
5918	C ₂₆ H ₅₄	<i>n</i> -Hexacosane CH ₃ (CH ₂) ₂₄ CH ₃	366.42	60	296 ⁴⁰	0.779	
5919	C ₂₆ H ₅₄	Isohexacosane	366.42	61	207 ^{0.7}		
5920	C ₂₆ H ₅₄ O	Ceryl alcohol C ₂₆ H ₅₄ OH	382.42	80			
5921	C ₂₇ H ₂₈ Br ₂ N ₂ O ₅	Quinine dibromosalicylate	620.06	198			
5922	C ₂₇ H ₂₈ N ₆ S ₃	Diphenylguanidine trithiocarbonate	532.46	89			
5925	C ₂₇ H ₃₀ N ₂ O ₅	Quinine salicylate	462.25	187			1333
5926	C ₂₇ H ₃₀ O ₁₅	Apiin	594.23	228			
5927	C ₂₇ H ₃₀ O ₁₆	Sophorin	610.23	166			
5928	C ₂₇ H ₃₂ O ₁₆	Rutin	612.25	183	d.		
5929	C ₂₇ H ₃₈ O ₇	Strophantidin	474.29	195			
5930	C ₂₇ H ₃₉ N ₅ O ₅	Paucine	513.34	126			
5931	C ₂₇ H ₄₀ O ₈	Cerberin	492.31	192			
5932	C ₂₇ H ₄₂ O	Ergosterin	382.32	165			
5933	C ₂₇ H ₄₆ O	Cholesterin	386.35	148	> 360	1.067	
5934	C ₂₇ H ₄₆ O	Phytosterol	386.35	136			
5935	C ₂₇ H ₄₆ O	Sitosterol	386.35	140			
5936	C ₂₇ H ₄₆ O ₂	Atropurol	402.35	285			
5937	C ₂₇ H ₄₇ N	Cholesterylamine	385.37	104			
5938	C ₂₇ H ₄₇ NO ₉	Indaconine	529.37	94			
5939	C ₂₇ H ₄₈ O	Coprosterol	388.37	105			
5940	C ₂₇ H ₅₀ O ₆	Tricaprylin	470.39	8		0.954	425
5941	C ₂₇ H ₅₄ O	Myristone (C ₁₈ H ₂₇) ₂ CO	394.42	76		0.792 ₄ ^{90.9}	
5942	C ₂₇ H ₅₆	<i>n</i> -Heptacosane CH ₃ (CH ₂) ₂₅ CH ₃	380.43	59.5	270 ¹⁶	0.779 ₄ ^{89.8}	
5943	C ₂₈ H ₁₈	9, 9'-Dianthranyl	354.14	300			
5944	C ₂₈ H ₂₀ N ₂	Amaron (Tetraphenylpyrazine)	384.17	240			
5945	C ₂₈ H ₂₂ N ₂ O	Benzoylamarin	402.19	180			
5946	C ₂₈ H ₂₂ O ₂	Anthrapinacone	390.17	182 d.			
5947	C ₂₈ H ₂₄ N ₂	Benzylamarin	388.20	124			
5948	C ₂₈ H ₂₈ N ₂ O ₅	Strychnine salicylate	472.23				1333
5949	C ₂₈ H ₃₀ O ₂	Columbin	398.23	182			
5950	C ₂₈ H ₃₄ O ₁₁	Phillirin	546.26	160			
5951	C ₂₈ H ₃₆ N ₂ O ₄	Ipecamine	464.29	90			
5952	C ₂₈ H ₃₆ N ₂ O ₄	Psychotrine	464.29	138			
5953	C ₂₈ H ₃₆ O ₇	Digitogenic acid	484.28	210			
5954	C ₂₈ H ₃₈ N ₂ O ₄	Cephaeline	466.31	99			
5955	C ₂₈ H ₃₈ N ₂ O ₄	Hydroipecamine	466.31	92			
5956	C ₂₈ H ₃₈ O ₇	α-Elaterin	486.29	232			
5957	C ₂₈ H ₃₈ O ₇	β-Elaterin	486.29	195			
5958	C ₂₈ H ₄₄ O ₂	Lactucerin	412.34	210			
5959	C ₂₈ H ₄₆ NO	Behenolic anilide C ₂₁ H ₃₉ CONHC ₆ H ₅	411.36	72			
5960	C ₂₈ H ₄₆ NO ₉	Isopyroine	540.36	160			
5961	C ₂₈ H ₄₆ O ₂	Cholesteryl formate	414.35				1216
5962	C ₂₈ H ₄₇ NO	Brassicic anilide C ₂₁ H ₄₁ CONHC ₆ H ₅	413.37	78			
5963	C ₂₈ H ₄₇ NO	Erucic anilide C ₂₁ H ₄₁ CONHC ₆ H ₅	413.37	66			
5964	C ₂₈ H ₄₈ O ₁₀	Gitalin	544.37	253			
5965	C ₂₈ H ₄₉ NO	Behenic anilide CH ₃ (CH ₂) ₂₀ CONHC ₆ H ₅	415.39	102			
5966	C ₂₈ H ₅₄ O ₂	<i>l</i> -Menthyl stearate	422.42	39			
5967	C ₂₈ H ₅₈	Octocosane CH ₃ (CH ₂) ₂₆ CH ₃	394.45	65	318 ⁴⁰	0.779	
5968	C ₂₈ H ₅₈ O	Cluetyl alcohol	410.45	82.5			
5969	C ₂₉ H ₂₄ O ₈	Fortoin (Methylenedicotoine)	500.19	213			
5970	C ₂₉ H ₂₆ O ₁₂	Aromadendrin	566.20	216			
5971	C ₂₉ H ₃₂ N ₂ O ₆	Quinine acetylsalicylate	504.26	157			
5972	C ₂₉ H ₃₄ NO ₇	Paniculatine	509.28	263			
5973	C ₂₉ H ₃₆ N ₂ O ₄	Emetamine	476.29	156			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
5974	C ₂₉ H ₄₀ N ₂ O ₄	Isoemetine.....	480.32	98			
5975	C ₂₉ H ₄₃ Cl ₂ N ₂ O ₄	Isoemetine hydrochloride.....	553.26	310 d.			
5976	C ₂₉ H ₄₃ NO ₇	Pseudojervine.....	517.34	307			
5977	C ₂₉ H ₄₃ NO ₈	Sabadenine.....	533.34	160	197 d.		1333
5978	C ₂₉ H ₄₈	Spinacene.....	396.37	< -20	260°	0.859 ²⁰ ₂₀	570
5979	C ₂₉ H ₄₈ O	Taraxasterol.....	412.37	222			
5980	C ₂₉ H ₄₉ O ₃	Phytosterol acetate.....	445.38	122			
5981	C ₂₉ H ₅₀ O ₅	Cluytanol.....	478.39	300			
5982	C ₂₉ H ₅₁ NO ₈	Sabadine.....	541.40	240			
5983	C ₂₉ H ₅₂ O ₂₀	Sapotin.....	720.40	240			
5984	C ₂₉ H ₅₈ O ₂	Montanic acid.....	438.45	86.8			
5985	C ₂₉ H ₆₀	Nonacosane CH ₃ (CH ₂) ₂₇ CH ₃	408.46	63.6	348 ⁴⁰	0.780	
5986	C ₃₀ H ₂₀ NO ₉	Adlumidine.....	538.16	234			
5987	C ₃₀ H ₂₂ O ₁₀	Santalol.....	548.22	226	195°		
5989	C ₃₀ H ₂₄ O ₁₃	Picrotoxin.....	602.26	200			
5990	C ₃₀ H ₂₆ O ₄	Hellesboresin.....	462.29	150 d.			
5991	C ₃₀ H ₄₀ N ₂ O ₅	Emetine.....	508.32	74			
5993	C ₃₀ H ₄₂ Cl ₂ N ₂ O ₅	Emetine dihydrochloride.....	581.26	53			1333
5994	C ₃₀ H ₄₂ I ₂ N ₂ O ₅	Emetine dihydroiodide.....	764.20	238			
5995	C ₃₀ H ₄₃ N ₂ O ₁₆ S ₂	Sinalbin.....	734.47	138.5			
5996	C ₃₀ H ₄₄ N ₄ O ₈ S	Physostigmine sulfate.....	648.45	140			
5997	C ₃₀ H ₄₄ O ₉	Cymarol.....	548.34	138 d.			
5998	C ₃₀ H ₄₆ O ₁₂	Ouabain.....	598.35	185			
5999	C ₃₀ H ₄₈ O ₂	Echicerin.....	440.37	157			
6000	C ₃₀ H ₄₈ O ₂	Mycosterol.....	440.37	160			
6001	C ₃₀ H ₄₈ O ₈	β-Quinovin.....	536.37	235			
6002	C ₃₀ H ₅₀ O	α-Amyrin.....	426.39	185	> 300		
6003	C ₃₀ H ₅₀ O	β-Amyrin.....	426.39	195			
6004	C ₃₀ H ₅₀ O	Androsterol.....	426.39	208			
6005	C ₃₀ H ₅₀ O	Stigmasterol.....	426.39	140			
6006	C ₃₀ H ₅₀ O ₂	Betulin.....	442.39	252			
6007	C ₃₀ H ₅₀ O ₂	Cholesterol propionate.....	442.39	98.7			
6008	C ₃₀ H ₅₂ O ₄	Menthyl camphorate.....	476.40	86			
6009	C ₃₀ H ₅₄ N ₄ O ₈ S	Sparteine sulfate.....	566.51				1333
6010	C ₃₀ H ₆₀	Melene.....	420.46	63	380	0.890	
6011	C ₃₀ H ₆₀ O ₂	Melissic acid CH ₃ (CH ₂) ₂₈ CO ₂ H.....	452.46	91			
6012	C ₃₀ H ₆₀ O ₄	Lanoceric acid.....	484.46	105			
6013	C ₃₀ H ₆₂	Melissane.....	422.48	74	222 ^{0.3}		
6014	C ₃₀ H ₆₂	n-Triacontane CH ₃ (CH ₂) ₂₈ CH ₃	422.48	70	235 ^{1.0}	0.780	
6015	C ₃₀ H ₆₂ O	Melissyl alcohol.....	438.48	88		0.777 ⁶⁶	
6016	C ₃₀ H ₆₂ O ₂	Cocceryl alcohol.....	454.48	104			
6017	C ₃₁ H ₁₆ NO ₄	Apomorphine dibenzoate.....	465.12	156			
6018	C ₃₁ H ₂₆ O ₁₀	Tephrosin.....	558.20	187			
6019	C ₃₁ H ₂₇ NO ₆	Dibenzoylmorphine.....	493.22	190.5			
6020	C ₃₁ H ₂₈ O ₁₀	Kosin.....	570.29	142			1333
6021	C ₃₁ H ₄₂ NO ₁₁	Napelline.....	603.36	165			
6022	C ₃₁ H ₄₃ O	Lupeol.....	431.33	170			
6023	C ₃₁ H ₅₀ O	Lupeol.....	438.39	215			
6024	C ₃₁ H ₅₂ O ₂	Cholesterol butyrate.....	456.40	92.8			
6025	C ₃₁ H ₅₂ O ₂	Euonysterol.....	456.40	138			
6026	C ₃₁ H ₅₂ O	Palmitone (C ₁₅ H ₃₁) ₂ CO.....	450.48	83		0.795 ^{20.9} ₁	1125
6027	C ₃₁ H ₅₂ O ₃	Cocceric acid.....	482.48	93			
6028	C ₃₁ H ₅₄	n-Hentriacontane CH ₃ (CH ₂) ₂₉ CH ₃	436.49	68.1	302 ¹⁸	0.781 ^{48.1} ₁	
6029	C ₃₂ H ₂₂ O ₁₀	Heraclin.....	566.17	185			
6030	C ₃₂ H ₃₆	Pentaphenylethane.....	410.20	173			
6031	C ₃₂ H ₂₇ N ₃ O	Benzacine.....	469.23	150			
6032	C ₃₂ H ₄₁ NO ₉	Pyraconitine.....	583.32	171			
6032.1	C ₃₂ H ₄₂ N ₂ O ₉	Lappaconitine.....	598.34	223			
6033	C ₃₂ H ₄₄ N ₂ O ₁₀ S	Homoatropine sulfate.....	648.42				1333
6034	C ₃₂ H ₄₄ O ₁₀	Quassiin.....	588.34	211			
6035	C ₃₂ H ₄₆ NO ₉	Indobenzaconine.....	587.36	130			
6036	C ₃₂ H ₄₆ BrNO ₁₀	Benzaconine hydrobromide.....	684.28	282			
6037	C ₃₂ H ₄₆ ClNO ₁₀	Benzaconine hydrochloride.....	639.82	α 217; β 268			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
6038	$C_{32}H_{48}N_2O_{14}S$	Sinapine sulfate.....	716.45	193			
6039	$C_{22}H_{49}NO_3$	Veratrine.....	591.39	205			
6040	$C_{22}H_{41}NO_{11}$	Protoveratrine.....	625.40	250			
6041	$C_{22}H_{32}N_2O_3$	Lycopodine.....	512.42	115			
6042	$C_{22}H_{32}O_2$	Echitin.....	468.40	170			
6043	$C_{22}H_{34}O_2$	Cholesterol valerate.....	470.42	89.6			
6044	$C_{22}H_{34}O_2$	Phytosterol valerate.....	470.42	30			
6045	$C_{22}H_{32}O_2$	Palmitic anhydride ($C_{16}H_{31}CO$) ₂ O.....	494.48	64			
6046	$C_{22}H_{32}O_{16}$	Convolvulin (Rhodeoretin).....	702.48	158			
6047	$C_{22}H_{44}O_2$	Cetyl palmitate $C_{18}H_{37}CO_2C_{16}H_{33}$	480.49	54			
6048	$C_{22}H_{46}$	<i>n</i> -Dotriacontane $CH_3(CH_2)_{20}CH_3$	450.51	75	310 ¹⁵	0.832 ₄ ⁵⁰ 0.775 ^{79,4}	1110
6049	$C_{22}H_{40}O_{19}$	Robinin.....	740.31	195			
6050	$C_{22}H_{43}NO_{11}$	Anhydroaconitine.....	629.34	186			
6051	$C_{22}H_{46}N_2O_9$	Septentrionaline.....	614.37	131			
6052	$C_{22}H_{40}O_{10}$	Tormentol.....	606.39	228			
6053	$C_{22}H_{33}NO_7$	Solanguistine.....	575.42	235 d.			
6054	$C_{22}H_{34}O_2$	Cholesterol capronate.....	484.43	91.2			
6055	$C_{22}H_{36}O_6$	Phytosteroline.....	548.43	290			
6056	$C_{22}H_{32}O_6$	Tricaprin.....	554.48	31.1		0.921 ₄ ⁴⁰	1054
6057	$C_{22}H_{36}O_2$	Psyllostearic acid.....	494.51	95			
6058	$C_{22}H_{36}O$	Psyllostearyl alcohol.....	480.52	69.5			
6059	$C_{22}H_{32}O_6$	Isoeugenol dibenzoate.....	536.25	161			
6060	$C_{22}H_{36}N_2O_6$	Pseudomorphine.....	568.29	327 d.			
6061	$C_{22}H_{36}N_2O_9$	Sekisanine.....	616.29	200			
6062	$C_{22}H_{40}N_2O_{16}S$	Morphine sulfate.....	668.39	250 d.			1333
6063	$C_{22}H_{40}N_2O_{15}S_2$	Quinine diguaiacolsulfonate.....	732.45	130 d.			
6064	$C_{22}H_{44}N_2O_8S$	Apoatropine sulfate.....	640.42				1333
6065	$C_{22}H_{44}O_8$	<i>d</i> -Camphor salicylate.....	580.34	60			
6066	$C_{22}H_{47}NO_{10}$	Indaconitine.....	629.37	203			
6067	$C_{22}H_{47}NO_{11}$	Aconitine.....	645.37	195			
6068	$C_{22}H_{48}BrNO_{11}$	Aconitine hydrobromide.....	726.29	163			1333
6069	$C_{22}H_{48}ClNO_{11}$	Aconitine hydrochloride.....	681.84	149			1333
6070	$C_{22}H_{48}N_2O_{10}S$	Atropine sulfate.....	676.45	194			1333
6071	$C_{22}H_{48}N_2O_{10}S$	Hyoscyamine sulfate.....	676.45	206			1333
6072	$C_{22}H_{48}N_2O_{14}$	Aconitine nitrate.....	708.39				1333
6073	$C_{22}H_{49}NO_{11}$	Japaconitine.....	647.39	204.2			
6074	$C_{22}H_{50}ClNO_{11}$	Japaconitine hydrochloride.....	683.85	149			
6075	$C_{22}H_{50}O_2$	Cholesterol benzoate.....	490.39	145.5			
6076	$C_{22}H_{50}O_2$	Cholesterol salicylate.....	506.39	180			1180
6077	$C_{22}H_{54}O_{11}$	Digitoxin.....	638.42	244			
6078	$C_{22}H_{54}O_{16}$	Jalapin.....	720.43	150			
6079	$C_{22}H_{57}NO_2$	Solanidine.....	511.45	215			
6080	$C_{22}H_{70}$	<i>n</i> -Tetratriacontane.....	478.54	76.5	255 ^{1,0}	0.781	
6081	$C_{22}H_{70}O$	Incarnatryl alcohol.....	494.54	74			
6082	$C_{22}H_{38}O_{12}$	Filixic acid.....	650.29	184			
6083	$C_{22}H_{39}N_2O_8$	Ergotinine.....	609.34	229 d.			1333
6084	$C_{22}H_{41}N_2O_6$	Ergotoxine.....	627.36	164			
6085	$C_{22}H_{44}N_2O_{10}P$	Ergotoxine phosphate.....	725.40	187			
6086	$C_{22}H_{36}O_2$	Echiretin.....	508.43	52			
6087	$C_{22}H_{36}O_{14}$	Digitalin.....	700.43	217			
6088	$C_{22}H_{38}O_8$	Phytosterolene acetate.....	607.45	160			
6089	$C_{22}H_{40}NO_4$	Imperialine.....	558.47	254 d.			
6090	$C_{22}H_{70}O$	Stearone ($C_{17}H_{35}$) ₂ CO.....	506.54	88			
6091	$C_{22}H_{72}$	<i>n</i> -Pentatriacontane.....	492.55	74.7	331 ¹⁵	0.793 ₄ ⁵⁶ 0.782 ₄ ^{74,7}	
6092	$C_{22}H_8O_6$	Lophopetalin.....	533.04	230			
6093	$C_{22}H_{34}N_2O_8S$	Aporheine sulfate.....	654.34	75			
6094	$C_{22}H_{34}N_2O_{13}$	Cynoctonine.....	702.28	137			
6095	$C_{22}H_{42}O_6$	Helleborin.....	570.32	> 250 d.			
6096	$C_{22}H_{42}O_{13}$	Filicic acid.....	682.32	125			
6097	$C_{22}H_{44}N_2O_{10}S$	Codeine sulfate.....	696.42	278			1333
6098	$C_{22}H_{48}O_{10}$	α -Picrasmin.....	640.37	204			
6099	$C_{22}H_{48}O_{10}$	β -Picrasmin.....	640.37	212			
6100	$C_{22}H_{30}N_2O_6$	Pyramidon camphorate.....	662.43	90			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	<i>d</i>	R. I. No.
6101	C ₃₆ H ₈₁ NO ₁₁	Bikhaconitine.....	673.40	113			
6102	C ₃₆ H ₈₁ NO ₁₂	Pseudaconitine.....	689.40	211			
6104	C ₃₆ H ₆₉ O ₃₁	Inulin.....	990.48	178 d.		1.35	
6105	C ₃₆ H ₆₉ O ₃	Oleic anhydride.....	546.51	22.2			
6106	C ₃₆ H ₇₀ O ₃	Stearic anhydride [CH ₃ (CH ₂) ₁₄ CO] ₂ O...	550.54	72			
6107	C ₃₆ H ₇₄	Hexatriacontane.....	506.57	76.5	265 ^{1.0}	0.782 ⁷⁴	
6108	C ₃₇ H ₇₅ N ₃ O ₉	Xanthaline.....	652.29	208			
6109	C ₃₇ H ₈₁ NO ₁₁	Taxine.....	685.40	82 d.			
6110	C ₃₇ H ₆₄ O ₂	Cholesterol caprinate.....	540.49	82.2			
6111	C ₃₈ H ₄₄ N ₂ O ₁₂	Morphine tartrate.....	720.36				1333
6112	C ₃₈ H ₄₄ N ₄ O ₂	Dicinchonine.....	588.37	40			
6113	C ₃₈ H ₄₆ N ₂ O ₈	α-Truxilline.....	658.37	80			
6114	C ₃₈ H ₄₆ N ₂ O ₈	β-Truxilline.....	658.37	45			
6115	C ₃₈ H ₄₆ N ₄ O ₈ S	Cinchonidine sulfate.....	686.45	242			
6116	C ₃₈ H ₄₆ N ₄ O ₈ S	Cinchonine sulfate.....	686.45	198.5			
6117	C ₃₈ H ₄₆ N ₄ O ₈ S	Cupreine sulfate.....	718.45	257 d.			
6119	C ₃₉ H ₄₁ NO ₁₂	Adlumine.....	715.32	188			
6120	C ₃₉ H ₆₃ NO ₁₀	Zygadenine.....	705.49	200			
6120.1	C ₃₉ H ₇₄ O ₈	Trilaurin.....	638.57	46.5		0.891 ⁶⁶	
6122	C ₄₀ H ₄₀ N ₂ O ₁₀ S ₂	Quinine-β-naphtholsulfonate.....	772.45	186			
6124	C ₄₀ H ₄₀ N ₄ O ₈ S	Quinine sulfate.....	746.48	235.2			
6125	C ₄₀ H ₅₆ O ₁₈	Strophantin.....	776.43	179			
6126	C ₄₀ H ₇₀ O ₂	Homoeuonysterol.....	582.54	134			
6127	C ₄₁ H ₈₀ N ₄ O ₇	Quinine carbonate.....	710.42	169			
6129	C ₄₂ H ₄₆ N ₄ O ₈ S	Strychnine sulfate.....	766.45	200			
6131	C ₄₂ H ₆₄ N ₂ O ₇	Tritopine.....	698.43	182			
6133	C ₄₂ H ₆₆ O ₆	Caulosapogenin.....	666.51	315			
6135	C ₄₂ H ₇₀ O ₂	Echitein.....	606.54	195			
6136	C ₄₂ H ₄₆ N ₂ O ₂₄	Quinoline tartrate.....	987.37	125			
6137	C ₄₂ H ₅₇ N ₄ O ₁₀ P	Quinine glycerophosphate.....	820.50	181			
6138	C ₄₄ H ₅₄ N ₄ O ₈	Quinine succinate.....	766.45	192			
6139	C ₄₄ H ₅₄ N ₄ O ₈	Quinine malate.....	782.45	177.5			
6141	C ₄₄ H ₅₄ N ₄ O ₁₀	Quinine tartrate.....	798.45	202.5			1333
6142	C ₄₄ H ₆₄ NO ₁₉	Glycyrrhizic acid.....	910.50	220			
6143	C ₄₄ H ₇₆ O ₂₀	Sarsasaponin.....	924.59	248			
6144	C ₄₄ H ₉₂ O ₂	Brassicid anhydride.....	658.63	64		0.835 ⁷⁰	1145
6145	C ₄₄ H ₉₂ O ₂	Erucic anhydride.....	658.63	48			1144
6147	C ₄₆ H ₉₆ O ₆	Trimyrustin.....	722.66	55		0.885 ⁶⁰	1089
6148	C ₄₆ H ₈₀ N ₄ O ₁₀	Strychnine <i>d</i> -tartrate.....	818.42	228		1.429	
6150	C ₄₆ H ₈₆ N ₂ O ₂₀ S	Narceine sulfate.....	988.51				1333
6151	C ₄₇ H ₈₄ O ₁₆	Filmaron.....	874.42	60			
6153	C ₄₈ H ₉₂ NO ₉	Phrenosin.....	827.72	215 s. d.			
6154	C ₄₉ H ₈₀ O ₂₃	Gitonin.....	1036.6	272 d.			
6155	C ₅₀ H ₆₆ O ₃₀	Hyssopin.....	1146.5	275			
6156	C ₅₀ H ₇₀ O ₈	Lupulinic acid.....	798.54	93			
6157	C ₅₁ H ₉₈ O ₆	Tripalmitin.....	806.76	65.1; 46		0.866 ⁸⁰	1114
6158	C ₅₂ H ₉₁ NO ₁₈	Solanine.....	1017.7	254 d.			
6159	C ₅₂ H ₉₃ ClNO ₁₈	Solanine hydrochloride.....	1054.2	212			
6160	C ₅₂ H ₁₀₄ O ₂	Ceryl cerotate.....	760.80	84			
6161	C ₅₄ H ₈₈ O ₁₇	Caulosaponin (Leontin).....	1008.7	255			
6163	C ₅₆ H ₇₄ N ₄ O ₁₂ S	Psychotrine sulfate.....	1026.7	217			
6164	C ₅₆ H ₈₈ O ₉	Caulophyllosapogenin.....	904.68	315			
6165	C ₅₇ H ₁₀₄ O ₆	Glycerol trielaidate.....	884.80	32			
6166	C ₅₇ H ₁₀₄ O ₆	Glycerol trioleate.....	884.80	-17	240 ¹⁸	0.915	
6167	C ₅₇ H ₁₀₄ O ₉	Glycerol triricinoleate.....	932.80			0.959	
6168	C ₅₇ H ₁₁₀ N ₂ O ₁₅	Pyosin.....	1062.9	238			
6169	C ₅₇ H ₁₁₀ O ₆	Tristearin.....	890.85	54.5; 70.8		0.862 ⁸⁰	1115
6170	C ₅₈ H ₄₆ O ₂₃	Fustin.....	1110.4	219			
6172	C ₅₆ H ₁₀₄ O ₁₇	Caullophyllosapogenin.....	1168.8	260			
6173	C ₅₈ H ₉₆ N ₂ O ₂₈ S	Aconitine sulfate.....	1388.8				1333
6175	C ₇₂ H ₈₈ N ₆ O ₂₀	Quinine citrate.....	1356.7	183.5			

REFRACTIVE INDEX

A. LIQUIDS

Serial No.	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$
1	586	1.306	0.0045	86	1005	1.3927	0.0070	171	3995	1.408	0.0072	258	3988	1.421	
2	60	1.329	0.0054	87	2933	1.3929	0.0080	172	4007	1.408	0.0068	259	2407	1.4213	
3	208	1.3316	0.0061	88	724	1.3930	0.0070	173	2344	1.4082		260	569	1.4216	0.0113
4	141	1.3419	0.0051	89	2392	1.393	0.0068	174	3998	1.408	0.0072	261	2892	1.4217	0.0071
5	213	1.344	0.0060	90	3369	1.393	0.0062	175	1012	1.4086	0.0072	262	1067.1	1.4219	
6	168	1.3474	0.0058	91	1654	1.3932	0.0068	176	1100	1.4088	0.0074	263	2301	1.4223	0.0076
7	793	1.3526	0.0061	92	1659	1.3935		177	420	1.4093		264	358	1.4224	
8	513	1.3534	0.0058	93	822	1.394	0.0074	178	2934	1.4095		265	2400	1.4226	0.0070
9	1072	1.355	0.0062	94	2926	1.3947	0.0066	179	1080	1.410	0.0070	266	2405	1.4226	
10	1073	1.3564	0.0040	95	1651	1.3951	0.0068	180	2985	1.410	0.0076	267	658	1.4227	0.0075
11	1049	1.3574	0.0056	96	1639	1.3959	0.0074	181	1044	1.4103		268	4412	1.4228	
12	794.1	1.3576		97	2362	1.3959		182	1570	1.4104	0.0074	269	2351	1.423	0.0075
13	794	1.3579	0.0062	98	747	1.3960		183	1730	1.411		270	2409	1.423	0.0072
14	448	1.3591	0.0068	99	790	1.396	0.0068	184	3329	1.4110		271	3357	1.423	
15	451	1.3597	0.0063	100	2354.1	1.3960		185	3994	1.411		272	2330	1.4235	0.0075
16	489	1.3613	0.0079	101	598	1.3962		186	2331	1.4114		273	28	1.4237	0.0060
17	262	1.361	0.0061	102	686	1.3962		187	2910	1.4114		274	2965	1.4238	
18	452	1.3619	0.0062	103	2937	1.3964		188	1602	1.4115		275	220	1.4239	0.0093
19	396	1.363	0.0070	104	791	1.397	0.0068	189	4000	1.4116		276	711	1.4240	
20	447	1.3636	0.0067	105	495	1.3972	0.0081	190	657	1.4118		277	999	1.4240	
21	233	1.3639	0.0062	106	1085.1	1.3973		191	1043	1.4119	0.0073	278	2419	1.424	0.0078
22	395	1.3664	0.0060	107	228	1.3974	0.0073	192	2326	1.412	0.0090	279	2967	1.424	
23	1716	1.369	0.0064	108	2359	1.3975		194	651	1.4121	0.0081	280	3325	1.424	0.0193
24	1086	1.3695	0.0063	109	723	1.3979	0.0070	195	3335	1.4122		281	4012	1.424	0.0078
25	37	1.3714	0.0072	110	748	1.398		196	3311	1.4123	0.0071	282	4161	1.424	0.0073
26	212	1.3719	0.0066	111	821	1.398	0.0074	197	3999	1.4126		283	1557	1.4242	0.0106
27	1715	1.372	0.0065	112	2941	1.3980	0.0069	198	3986	1.4127	0.0072	284	3308	1.4242	
28	773	1.3723	0.0078	113	624	1.3984	0.0086	199	1619	1.4128		285	657.1	1.4247	
29	725	1.3727	0.0064	114	2940	1.398	0.0070	200	1070	1.4129	0.0118	286	3309	1.4248	
30	718	1.3730	0.0070	115	1640	1.399		201	1645	1.4130	0.0073	287	2403	1.425	0.0074
31	984	1.3758	0.0080	116	789	1.3993	0.0069	202	2343	1.4131	0.0073	288	2868	1.425	
32	1713	1.376	0.0065	117	671	1.3996		203	2846	1.4131	0.0073	289	465	1.4251	0.0093
33	665	1.3767	0.0051	118	1652	1.3997	0.0068	204	446	1.4134	0.0094	290	616	1.4254	0.0071
34	1714	1.377	0.0065	119	356	1.3998	0.0127	205	1730.1	1.4135		291	2406	1.4254	
35	727	1.3771	0.0066	120	2905	1.3999		206	948	1.4136	0.0051	292	2987	1.4254	
36	726	1.3779	0.0065	121	917	1.4004	0.0096	207	1643	1.4138	0.0074	293	3314	1.4259	
37	506	1.378	0.0065	122	2354	1.4005	0.0069	208	2309	1.4138	0.0072	294	4419	1.426	0.0081
38	1712	1.3783	0.0064	123	2361	1.4005	0.0069	209	3338	1.414		295	928	1.4263	
39	823	1.3786	0.0070	124	1636	1.4006	0.0071	210	4001	1.414	0.0072	296	2899	1.4268	0.0076
40	719	1.3791	0.0071	125	3365	1.4008		211	1726.1	1.4141		297	2962	1.427	0.0073
41	1741	1.3807	0.0066	126	2357	1.4009	0.0070	212	587	1.4144		298	2963	1.4270	
42	1746	1.3819	0.0065	127	1534	1.4010	0.0098	213	3982	1.4145		299	4585	1.427	0.0075
43	48	1.382	0.0089	128	1617	1.401	0.0090	214	1733.1	1.4146		300	4586	1.427	0.0074
44	1610	1.3821		129	1764	1.401	0.0081	215	2411	1.4149		301	949	1.4271	
45	2387	1.3825		130	2353	1.4012		216	1571	1.415		302	3962	1.4271	
46	146	1.3828		131	820	1.401	0.0075	217	1644	1.4150	0.0073	303	721	1.4272	
47	667	1.383		132	746	1.4015	0.0071	219	2873	1.415	0.0090	304	1612	1.4273	0.0075
48	1015	1.384		133	2901.1	1.4015		220	3993	1.415	0.0075	305	264	1.4274	0.0072
49	1019	1.3840		134	2938	1.4016		221	3336	1.4153	0.0073	306	3939	1.4275	
50	717	1.3843	0.0071	135	2942	1.402	0.0070	222	375	1.4154	0.0100	307	3975	1.4275	
51	1017	1.3844	0.0066	136	487	1.4022		223	966	1.4156	0.0081	308	2964	1.4278	
52	1020	1.3844	0.0067	137	775	1.4026	0.0080	224	2396	1.4159		309	744	1.428	0.0095
53	1739	1.3849		138	2935	1.4026		225	2896	1.4161	0.0075	310	3310	1.4284	
54	247	1.385		139	2909.1	1.4030		226	66	1.4164	0.0076	311	2386.1	1.4288	
55	2389	1.385	0.0091	140	2904	1.4035		227	189	1.4166	0.0080	312	4172	1.4289	0.0077
56	1063	1.3851		141	2912	1.4036		228	2397	1.4172		313	1027	1.429	
57	1026	1.3852	0.0063	142	1560	1.4038	0.0071	229	3936	1.4174	0.0194	314	4162	1.4293	
58	1016	1.3858	0.0068	143	3347	1.404		230	3372	1.4176	0.0084	315	449	1.4295	
59	505	1.386	0.0066	144	3349	1.4040		231	1736	1.4178		316	4153	1.4299	0.0075
60	749	1.386		145	1013	1.4043	0.0071	232	911	1.4179	0.0044	317	2867	1.430	0.0076
61	2382	1.3861	0.0064	146	937	1.4045	0.0085	233	2944	1.4184		318	2966	1.430	0.0075
62	1007	1.3862	0.0070	147	3353	1.4047		234	4178	1.4184		319	2986	1.430	0.0076
63	450	1.3868	0.0068	148	2903	1.4049		235	968	1.4185	0.0075	320	3356	1.430	0.0074
64	792	1.387	0.0067	149	1760	1.405	0.0075	236	969	1.4185	0.0105	321	1629	1.4302	
65	824	1.387	0.0075	150	1768	1.405		237	479	1.4186	0.0104	322	2953	1.4303	
66	269	1.3874		151	3354	1.405		238	1695	1.4194	0.0073	323	273	1.4306	0.0102
67	1064	1.3874	0.0074	152	378	1.4051	0.0080	239	2302	1.419		324	355	1.4306	0.0094
68	1018	1.3879	0.0066	153	1010	1.4051	0.0071	240	2320	1.4195		325	925	1.4306	0.0094
69	1001	1.3881	0.0131	154	1084.1	1.4053		241	943	1.4196	0.0091	326	3289	1.4306	
70	1004	1.3882	0.0072	155	1045	1.4056	0.0084	242	1734	1.4196	0.0071	327	3937	1.4309	0.0077
71	468	1.3886	0.0065	156	2936	1.4058		243	1561	1.4198	0.0081	329	3361	1.4310	
72	524	1.389	0.0074	157	1046	1.4060		244	1662	1.4198	0.0081	330	3363	1.431	
73	1653	1.389		158	1081	1.406	0.0070	245	1732	1.420		331	3940	1.4311	
74	1014	1.3891	0.0068	159	1603	1.406	0.0069	246	2847	1.420	0.0071	332	4843	1.4312	
75	1006	1.3895	0.0071	160	2275	1.406	0.0087	247	2955	1.4201		333	620	1.4314	0.0114
76	154	1.3898	0.0084	161	3330.1	1.4060		248	2970	1.4203		334	2412	1.4314	0.0073
77	2393	1.390	0.0068	162	3334	1.4060	0.0071	249	2971	1.4204		335	3355	1.4317	
78	809	1.3902	0.0060	163	2901	1.4065		250	3989	1.4204	0.0074	336	736	1.432	
79	1002	1.3902	0.0080	164	3333.1	1.4070		251	2400.1	1.4206		337	4852	1.4321	0.0076
80	1655	1.3903	0.0070	165	1084	1.4072	0.0070	252	896	1.4207	0.0087	338	3358	1.4322	
81	626	1.3904	0.0069	166	1079	1.4075	0.0071	253	2407.1	1.4209		339	2952	1.433	0.0073
82	972	1.3909		167	3381	1.4076		254	2954	1.4209					

Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$
344	3364	1.4338		434	2890	1.4503		524	2239	1.4763		616	3761	1.5042	
345	2318	1.434		435	3808	1.4505		525	106	1.4777		617	4981	1.5042	
346	464	1.4341	0.0092	436	648.3	1.4506		526	3927	1.4785		618	666	1.5046	
347	743	1.4344		437	585	1.4507	0.0087	527	3816	1.4788		619	2719	1.505	0.0159
348	3362	1.4345		438	648.2	1.451	0.0092	528	139	1.479		620	3763	1.5050	
349	192	1.4346		439	929	1.4512	0.0176	529	2797	1.4792	0.0116	621	475	1.5051	0.0148
350	158	1.4349	0.0089	440	3826	1.4515		530	4370	1.4792		622	3230	1.5051	0.0158
351	5010	1.4359		441	3917	1.4521		531	3908	1.4798		623	90	1.5055	0.0137
352	742	1.436	0.0092	442	2294	1.4524	0.0121	532	422	1.4801	0.0110	624	3679	1.5057	0.0163
353	924	1.436	0.0080	443	4010	1.4524	0.0095	533	3926	1.4803		625	4971	1.5057	
354	471	1.4362		444	1054	1.4530	0.0089	534	887	1.4805		626	2684	1.5058	0.0161
355	2849.1	1.4362		445	3805	1.4532		535	5164	1.4806	0.0102	627	2720	1.506	0.0161
356	258	1.4364	0.0126	446	285	1.4539	0.0035	536	5682	1.482		628	3154	1.506	0.0161
357	2968	1.437	0.0074	447	2888	1.4540		537	3824	1.4823		629	3678	1.506	0.0162
358	3961	1.437	0.0078	448	3893	1.4540		538	3922	1.4827	0.0096	630	815	1.5063	0.0130
359	5260	1.437	0.0076	449	5853	1.4543		539	3890	1.4828		631	4972	1.5065	
360	3303	1.4371		450	648.1	1.4550	0.0084	540	5480	1.483		632	689	1.507	
361	614	1.4373	0.0149	451	1595	1.455		541	3823	1.4846		633	2722	1.507	0.0164
362	1253	1.4375	0.0126	452	364	1.4554		542	3764	1.4848		634	4350	1.507	
363	3895	1.4376		453	4144	1.4556		543	1596	1.4867		635	4348	1.508	
364	17	1.438		454	4368.4	1.4556	0.0107	544	3865	1.4870	0.0147	636	3680	1.5081	0.0169
365	762	1.438	0.0096	455	107	1.4557	0.0094	545	4131	1.4872	0.0140	637	4827	1.5083	0.0140
366	3944	1.4380		456	5356	1.4557		546	3860	1.488		638	4545	1.5085	
367	604	1.4386	0.0082	457	5813	1.4558		547	3886	1.488		639	693	1.509	0.0127
368	811	1.4386	0.0097	458	222	1.4562	0.0110	548	5001	1.4881		640	2586	1.509	0.0188
369	3285	1.4388	0.0092	459	3880	1.4567		549	2927	1.489	0.0120	641	870	1.509	0.0163
370	927	1.4390	0.0131	460	648.4	1.4570		550	3725	1.4890		642	2775	1.5105	
371	470	1.4392		461	696	1.457		551	3765	1.4895		643	234	1.512	0.0163
372	741	1.4398	0.0089	462	3933	1.457	0.0081	552	2262	1.4903	0.0132	644	331	1.512	
373	1506	1.4404		463	2889	1.4574		553	3857	1.4911		645			
374	4179	1.4404		464	3969	1.4579		554	3724	1.4914		646	2721	1.512	0.0169
375	2813	1.4407	0.0098	465	5482	1.4580		555	221	1.4915		647	183	1.5128	0.0132
376	1089	1.441		466	2340	1.4581		556	3229	1.4920	0.0147	648	3244	1.513	0.0171
377	2812	1.4410	0.0112	467	2341	1.4590		557	4097	1.4922		649	3786	1.5131	0.0163
378	1041	1.4412	0.0083	468	2886	1.459	0.0082	558	4344	1.4922		650	3227	1.5132	0.0157
379	1098	1.4412	0.0091	469	2383	1.4594		559	3728	1.4925	0.0144	651	404	1.5134	0.0168
380	1366	1.4413	0.0122	470	11	1.4595	0.0079	560	1697	1.4929	0.0125	652	1330	1.514	0.0169
381	457	1.4414	0.0077	471	1478	1.4597		561	3223	1.4930	0.0146	653	4102	1.514	
382	1500	1.4415	0.0103	472	5371	1.4602	0.0084	562	3736	1.493	0.0140	654	3119	1.5143	
383	941	1.4416	0.0082	473	3974.1	1.4603		563	4097.1	1.4930		655	5141	1.516	0.0143
384	1252	1.4417		474	3902	1.4606		564	3882	1.4935		656	2589	1.5164	0.0132
385	2281	1.4419		475	3992	1.4606		565	4367	1.4939		657	5000	1.5164	
386	655	1.442	0.0084	476	12	1.4607	0.0097	566	4342	1.494		658	3754.2	1.5168	
387	3960	1.4420		477	3894	1.4609		567	140	1.4942		659	2163	1.517	0.0173
388	5156	1.442	0.0084	478	2339	1.461		568	3226	1.4943	0.0160	660	3235.1	1.5174	
389	1042	1.4421		479	3296	1.4614		569	4980	1.4946		661	4091.1	1.5175	
390	814	1.4425	0.0099	480	3915	1.4623		569.1	3731	1.495	0.0144	662	3740	1.5187	0.0157
391	1576	1.4425		481	5605	1.4626		570	5978	1.4951		663	3788	1.5201	0.0117
392	5688	1.4427		482	1105	1.463	0.0088	571	4098	1.4954	0.0133	664	412	1.5203	0.0131
393	764	1.4428	0.0098	483	4372	1.4630		572	1051	1.4955	0.0131	665	4318	1.5207	
394	2284	1.443		484	5606	1.4636		573	2688	1.4956	0.0158	666	2041	1.521	0.0164
395	648	1.4433		485	3947	1.4642		574	4983	1.4956		667	4560	1.521	
396	1096	1.4437		486	3273	1.4643		575	1588	1.4959	0.0104	668	2713.1	1.5211	
397	2825	1.4438		487	1328	1.4646	0.0145	577	2683	1.4959	0.0152	669	3755	1.5218	
398	2827	1.444		488	3948	1.4649		578	755	1.4960	0.0137	670	3170	1.5226	0.0206
399	3295	1.4441		489	366	1.4655	0.0132	579	2112	1.4962	0.0160	671	413	1.523	0.0124
400	190	1.4443	0.0084	490	136	1.4659		580	3228	1.4967	0.0113	672	2040	1.523	0.0165
401	1040	1.4444	0.0089	491	4148	1.4659		581	3856	1.4967		673	3149	1.5232	
402	4387	1.4445		492	2814	1.4660	0.0151	582	3726	1.4969		674	3757	1.5234	
403	1056	1.4450	0.0094	493	4374	1.4660		583	4366	1.4972		675	3096	1.523	
404	1537	1.4451		494	403	1.4666	0.0107	584	2685	1.4973	0.0158	676	3655	1.5236	
405	2327	1.4452		495	1756	1.467		585	3225	1.4975	0.0152	677	2714	1.5240	
406	2835	1.4453		496	2882	1.467	0.0084	586	3780	1.4976		678	3752	1.524	0.0157
407	1055	1.4454	0.0094	497	2796	1.4675		588	600	1.498	0.0117	679	2503	1.5242	
408	2283	1.4454		498	2240	1.4680		589	3677	1.498	0.0137	680	3688	1.5249	0.0196
409	4381	1.4455	0.0083	499	3854	1.4690		590	4975	1.4981		681	1307	1.525	0.0172
410	3968	1.4456		500	2058	1.4691	0.0144	591	4978	1.4984		682	3258	1.525	
411	619	1.4457	0.0129	501	176	1.4697	0.0112	593	3741	1.4986		683	4090.1	1.5250	
412	4856	1.4459		502	2059	1.470	0.0142	594	3286	1.4993	0.0116	684	3057	1.526	
413	1769	1.446		503	3811	1.4700		595	3681.1	1.4995		685	859	1.5261	0.0270
414	4376	1.4460		504	3891	1.4701		596	4974	1.4996		686	2111	1.5261	0.0198
415	148	1.4462		505	2057	1.4704	0.0153	597	476	1.4997	0.0056	687	594	1.5266	0.0173
416	1699	1.4464	0.0120	506	159	1.4711	0.0094	598	3277	1.4998	0.0213	688	1250	1.5267	0.0232
417	19	1.4467	0.0089	507	3858	1.4715		599	3152	1.500		689	3132	1.527	0.0183
418	4388	1.4468		508	863	1.4717	0.0141	600	754	1.5001	0.0140	690	3664	1.5271	0.0189
419	963	1.4469		509	3913.1	1.4723		601	3727	1.5003	0.0146	691	2039	1.528	0.0166
420	3827	1.4471		510	3810	1.4727	0.0114	602	4977	1.5005		692	3034	1.5282	
421	2850	1.4476		511	3952	1.4727		603	4976	1.5007		693	576	1.5285	0.0173
422	1692	1.4478	0.0088	512	515	1.4729	0.0078	604	1443	1.501	0.0160	694	4353	1.5285	
423	3892	1.4481	0.0092	513	3913	1.4729		605	4561	1.5011		695	3747	1.5286	0.0160
424	921.1	1.4482	0.0083	514	4115	1.473		606	1365	1.5014	0.0167	696	45	1.5297	0.0221
425	5940	1.4482		515	3806	1.473	0.0118	607	4324	1.5019	0.0147	697	2	1.5300	0.0117
426	2831	1.4486	0.0082	516	4371	1.4739		608	2810	1.5023	0.0245	698	3656	1.5301	0.0204
427	5013	1.4486		517	3879	1.4741		609	4828						

Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D	Dispersion $H_\beta - H_\alpha$
706	3237	1.5357	0.0168	731	1229	1.549	0.0176	756	2757	1.570	0.0217	781	102	1.6062	
707	1390	1.536	0.0216	732	2032	1.5490		757	2203	1.5714	0.0249	782	601	1.6077	
708	2618	1.5369	0.0222	733	3259	1.5492	0.0229	758	2204	1.5728	0.0230	783	1205	1.608	0.0217
709	2725	1.537	0.0180	734	2031	1.551		759	2004	1.5735	0.0315	784	1483	1.6081	0.0256
710	184	1.5379	0.0140	735	2639	1.551	0.0189	760	3642	1.5749		785	2061	1.609	0.0234
711	2038	1.539	0.0175	736	1347	1.5529	0.0252	761	2771	1.575	0.0162	786	2492	1.6094	
712	3606	1.5394	0.0210	737	1859	1.5537	0.0221	762	4930	1.576		787	1204	1.611	
713	2159	1.5399	0.0173	738	2030	1.555		763	4757	1.5761		788	3548	1.6149	0.0296
714	2161	1.540	0.0181	739	2763	1.5559	0.0225	764	1200.2	1.577		789	3549	1.616	0.0296
715	2162	1.540	0.0184	740	2633	1.556	0.0182	765	1200.1	1.5814		790	4038	1.618	0.0303
716	1388	1.5407	0.0213	741	1441	1.5562	0.0375	766	2255	1.583	0.0248	791	3069	1.6195	0.0424
716.1	1944	1.541		742	2762	1.558	0.0214	767	372	1.584		792	1333	1.621	0.0253
717	3789	1.5421	0.0220	743	964	1.559		768	1887	1.5861	0.0286	793	1369	1.6260	0.0265
718	2677	1.5425		744	2758	1.559	0.0217	769	1442	1.5863	0.0249	794	127	1.6277	0.0189
719	123	1.5437	0.0165	745	2578	1.5597	0.0270	770	2491	1.588		795	3455	1.633	0.0309
720	2195	1.5440	0.0175	746	4062	1.5598	0.0283	771	2756	1.5887	0.0248	796	128	1.638	0.0183
721	10	1.5442	0.0219	747	1294	1.560	0.0193	772	18	1.589	0.0176	797	428	1.642	
722	1389	1.5455	0.0202	748	2760	1.561	0.0214	773	151	1.5890	0.0162	798	1918	1.6509	0.0349
723	1290	1.546	0.0178	749	2098	1.5620	0.0227	774	1375	1.5895	0.0240	799	3453	1.658	0.0325
724	2081	1.5462		750	2767	1.5649	0.0230	775	4723	1.5921	0.0195	800	4263	1.6913	0.0356
725	2001	1.5464	0.0232	751	1857	1.5650	0.0209	776	1376	1.5931	0.0243				
726	3260	1.5469		752	649	1.567		777	1202	1.5979	0.0161				
727	2160	1.547	0.0185	753	1856	1.567	0.0230	778	101	1.5992	0.0193				
728	236	1.5472	0.0204	754	1176	1.5671	0.0207	779	4296	1.602	0.0290				
729	2082	1.5475		755	2423	1.5692	0.0214	780	126	1.603	0.0162				
730	3787	1.5481	0.0224												

Serial No.	Gen. index No.	Temperature $^{\circ}\text{C}$	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Temperature $^{\circ}\text{C}$	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Temperature $^{\circ}\text{C}$	Refractive index n_D	Dispersion $H_\beta - H_\alpha$
801	683	0	1.3752		857	4572	15	1.4644		912	3955	17	1.4385	0.0090
802	310	0	1.4538		858	4147	15	1.4708		913	568	17	1.4467	
803	209	7	1.3597	0.0058	859	3912	15	1.4801		914	3819	17	1.4674	0.0109
804	1327	7	1.6053		860	3863	15	1.4849		915	3821	17	1.4784	
805	930	7.5	1.4341	0.0094	861	3859	15	1.4871	0.0130	916	4993	17	1.5332	
806	3054	8.2	1.571	0.0234	862	4979	15	1.4921		917	3649	17	1.5671	
807	969.1	8.4	1.417		863	117	15	1.4982	0.0233	918	4404	17.1	1.4435	0.0072
808	4339	9.5	1.5301	0.0171	864	118	15	1.4998	0.0227	919	3820	17.1	1.4774	0.0116
809	22	10	1.2675	0.0052	865	4986	15	1.5018		920	3849	17.1	1.4895	0.0157
810	4304	10.8	1.6265	0.0337	866	988	15	1.5094	0.0071	921	982	17.2	1.3817	0.0085
811	807	11	1.4198	0.0077	867	100	15	1.5219	0.0148	922	2267	17.2	1.4511	0.0111
812	3591	11	1.5425	0.0188	868	3589	15	1.5632		923	3928	17.2	1.4638	0.0085
813	2832	11.9	1.4519	0.0084	869	3590	15	1.5736		924	339	17.4	1.5337	
814	2570	11.9	1.5503	0.0229	870	29	15	1.7425		925	340	17.4	1.5369	
815	2276	12	1.4468		871	4306	15.1	1.6477	0.0404	926	2830	17.5	1.4771	0.0104
816	2337	12	1.467		872	558	15.2	1.4735	0.0103	927	609	17.6	1.4588	0.0157
817	4323	12	1.5703	0.0253	873	359	15.3	1.4302		928	3245	17.6	1.5058	0.0157
818	2824	12.5	1.4208	0.0089	874	1541	15.3	1.4526	0.0084	929	5359	17.7	1.463	0.0092
819	1535	12.5	1.4559	0.0167	875	525	15.4	1.3770	0.0071	930	3638	17.8	1.4804	0.0085
820	2453	12.5	1.5524	0.0338	876	1546	15.4	1.4213	0.0092	931	3637	17.8	1.5451	0.0169
821	2580	12.7	1.5764	0.0298	877	3128	15.5	1.5647		932	920	18	1.4079	
822	89	12.9	1.4340	0.0101	878	3122	15.7	1.5747	0.0236	933	1000	18	1.4282	0.0094
823	1078	13	1.414		879	3661	15.8	1.5196	0.0274	934	4375.1	18	1.4565	
824	3818	13	1.479		880	983	16	1.378		935	3125	18	1.5441	0.0180
825	3851	13	1.4971	0.0135	881	1613	16	1.4013	0.0090	936	3667	18	1.5680	0.0251
826	5	13	1.5831		882	942	16	1.4083	0.0076	937	4813	18	1.5933	0.0280
827	3861	13.6	1.4540	0.0083	883	737	16	1.4156		938	545	18.1	1.5004	0.0168
828	608	13.7	1.4786	0.0128	884	3874	16	1.438		939	1022	18.2	1.4513	
829	1518	13.7	1.4993	0.0141	885	1555	16	1.4506	0.0123	940	3753	18.2	1.4999	0.0136
831	4041	13.9	1.6232	0.0312	886	3304	16	1.452		941	3037	18.2	1.6283	0.0312
832	2880	14	1.458		887	2884	16	1.455		942	1568	18.3	1.4198	
833	2342	14	1.462		888	2883	16	1.458		943	916	18.3	1.4221	0.0148
834	2878	14	1.463		889	2887	16	1.458		944	400	18.4	1.4058	0.0070
835	3812	14	1.4883	0.0172	890	3923	16	1.4762		945	2855	18.4	1.4607	0.0090
836	2579	14	1.5566	0.0248	891	5003	16	1.480		946	2818	18.4	1.4904	0.0124
837	4707	14	1.610		892	908	16	1.4888	0.0149	947	1341	18.5	1.5389	0.0211
838	2336	14.4	1.4397	0.0092	893	3654	16	1.5514		948	4260	18.5	1.635	
839	3852	14.5	1.4647	0.0084	894	84	16	1.580		949	935	18.8	1.4357	0.0096
840	3919	14.5	1.4787		895	379	16.1	1.4397	0.0079	950	773.1	18.9	1.4200	
841	3666	14.5	1.5439	0.0189	896	2279	16.3	1.4554	0.0159	951	4560	18.9	1.5198	0.0195
842	2289.1	14.6	1.4505	0.0083	897	3847	16.3	1.4846	0.0126	952	170	19	1.4117	
843	979	14.7	1.4098	0.0071	898	608.1	16.3	1.4971	0.0133	953	1554	19	1.4375	
844	3574	14.7	1.5740	0.0222	899	1548	16.4	1.4458	0.0136	954	2929	19	1.4435	0.0087
845	3762	14.8	1.5104	0.0201	900	4279	16.4	1.6157	0.0296	955	3807	19	1.4724	
846	4967	14.8	1.5128	0.0153	901	918	16.5	1.4402		956	3850	19	1.4900	
847	3283	14.9	1.4463	0.0103	902	3324	16.5	1.4632	0.0090	957	4987	19	1.4992	
848	1616	15	1.4065	0.0090	903	880	16.6	1.4470	0.0129	958	4988	19	1.5092	
849	622	15	1.4257		904	934	16.6	1.4527	0.0127	959	4994	19	1.5289	0.0111
850	713	15	1.4581		905	2816	16.6	1.4561	0.0104	960	2568	19	1.5485	0.0227
851	4004	15	1.4372		906	2570	16.6	1.5469	0.0230	961	4150	19.1	1.4714	0.0134
852	1533	15	1.4421		907	2538	16.6	1.5485	0.0240	962	4023	19.3	1.6546	0.0409
853	132	15	1.4490	0.0116	908	4587	16.8	1.4419		963	2298	19.5	1.4310	0.0102
854	133	15	1.4519	0.0101	909	1519	16.8	1.5077	0.0147	964	2299	19.5	1.4355	0.0105
855	5007	15	1.4628		910	2328	16.9	1.425	0.0076	965	3959	21	1.447	
856	4834	15	1.4638		911	313	17	1.3870	0.0104	966	3639	21	1.5390	

Serial No.	Gen. index No.	Temperature °C	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Temperature °C	Refractive index n_D	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Temperature °C	Refractive index n_D	Dispersion $H_\beta - H_\alpha$
967	4998	21.3	1.4979		1032	300	26.1	1.4540	0.0095	1097	560	63.1	1.4165	
968	2759	21.3	1.5591		1033	994	26.4	1.4954	0.0137	1098	288	63.9	1.4152	
969	4307	21.3	1.6544	0.0408	1034	1587	26.8	1.4877	0.0140	1099	156	65	1.4297	
970	3121	21.4	1.5370	0.0168	1035	816	27.5	1.4769	0.0126	1100	3071	66	1.5377	0.0169
971	2569	21.4	1.5407	0.0223	1036	5603	30	1.4559		1101	1231	69.9	1.5266	0.0171
972	2071	21.4	1.5637	0.0247	1037	3804	30	1.474		1102	3456	70.7	1.6079	0.0295
973	3600	21.4	1.5766	0.0311	1038	3981	31	1.4308		1103	2172	74	1.5425	0.0187
974	1496	21.6	1.4351	0.0114	1039	3126	33	1.5758	0.0295	1104	3414	76	1.6228	0.0303
975	2859	21.6	1.4766	0.0089	1040	2293	33.8	1.4561	0.0082	1105	4219	77.1	1.588	0.0265
976	4789	21.6	1.5743	0.0193	1041	5380	33.9	1.4358	0.0077	1106	3593	77.8	1.5678	0.0375
977	4814	21.6	1.6321	0.0400	1042	316	34.2	1.4146		1107	238	78.3	1.4274	0.0098
978	2928	21.9	1.4512		1043	5381	34.3	1.4347	0.0076	1108	5168	78.9	1.4283	0.0075
979	3297	22	1.4380		1044	3648	34.4	1.5537	0.0249	1109	2356	79	1.3732	0.0064
980	5765.1	22	1.4538		1045	5486	34.6	1.436	0.0076	1110	6048	79.4	1.4331	0.0077
981	3916	22	1.4604		1046	5852	35	1.4587		1111	5814	79.5	1.4283	0.0076
982	3822	22	1.4754		1047	5391	35.2	1.4349	0.0075	1112	617	79.7	1.4228	0.0126
983	3815	22	1.4770	0.0085	1048	4530.3	35.2	1.5526	0.0292	1113	5159	79.8	1.4273	0.0075
984	3813	22	1.4959		1049	2490	36	1.6332	0.0293	1114	6157	80	1.4381	
985	5005	22.2	1.4600	0.0081	1050	1011	36.5	1.3931	0.0070	1115	6169	80	1.4399	
986	3703	22.2	1.5604		1051	1627	37	1.4606	0.0078	1116	3801	80	1.4402	0.0089
987	301	22.3	1.4075	0.0093	1052	177	37.2	1.5258	0.0181	1117	5379	80.2	1.4299	0.0076
988	4559	22.3	1.4984	0.0140	1053	2096	38.6	1.5763		1118	4756	80.6	1.539	0.0187
989	2205	22.4	1.5711		1054	6056	40	1.4446		1119	5258	80.7	1.4175	0.0073
990	2199	22.5	1.5021		1055	1553	40	1.4467	0.0118	1120	5816	80.8	1.4236	0.0075
991	1357	22.5	1.5642	0.0242	1056	3272	40	1.4514	0.0150	1121	936	81	1.4342	0.0123
992	2493	22.5	1.5990		1057	5360	40	1.4533		1122	631	82.1	1.379	0.0067
993	3958	22.6	1.4484		1058	1314	40	1.5473		1123	4406	82.1	1.4183	0.0074
994	4373	22.6	1.4623	0.0083	1059	1315	40	1.5565		1124	2396	83.9	1.421	0.0083
995	46	22.7	1.4453	0.0113	1060	1316	40	1.5579		1125	6026	93.5	1.4297	0.0076
996	893	22.7	1.4852	0.0166	1061	4060.1	40	1.5726	0.0327	1126	3507	98.7	1.6206	0.0324
997	2468	22.7	1.5645	0.0231	1062	4039	40	1.6026	0.0289	1127	4218	98.8	1.6048	0.0293
998	2134	22.7	1.5760		1063	860	40.3	1.5238		1128	5402	99	1.5839	0.0219
999	3601	22.9	1.5494	0.0268	1064	1413	41	1.5425	0.0189	1129	2548	99.2	1.5021	0.0242
1000	2384	23	1.4531		1065	5610	42.9	1.434	0.0075	1130	5063	99.2	1.6762	0.0556
1001	4563	23	1.5300	0.0264	1066	4174	45.2	1.4294	0.0076	1131	921.2	99.3	1.4657	0.0121
1002	1430	23	1.5861	0.0231	1067	5694	45.3	1.4344	0.0076	1132	1206	99.3	1.5743	0.0204
1003	3547	23	1.6141	0.0298	1068	3587	46	1.5836		1133	4024	99.4	1.6211	0.0387
1004	2505	23.1	1.5272		1069	931	46.7	1.4434	0.0123	1134	4897	99.4	1.6803	0.0541
1005	3701	23.1	1.5802	0.0244	1070	239	47	1.415	0.0098	1135	3584	99.4	1.6828	
1006	3702	23.1	1.5898		1071	4297	47.3	1.5932	0.0281	1136	4899	99.4	1.6959	0.0591
1007	886	23.2	1.4365	0.0147	1072	993	48	1.4126	0.0079	1137	3583	99.4	1.7083	0.0515
1008	1628	23.3	1.4329	0.0094	1073	30	48	1.4418	0.0085	1138	3291	99.5	1.4760	0.0094
1009	314	23.4	1.4597	0.0102	1074	3802	48	1.4621		1139	5223	99.5	1.5021	0.0133
1010	4375	23.4	1.4619	0.0082	1075	2464	48	1.6231	0.0343	1140	4640	99.5	1.6959	0.0561
1011	4156	23.4	1.4624		1076	3412	48.5	1.6338	0.0305	1141	2819	99.6	1.4621	0.0094
1012	3191	23.4	1.5798		1077	56	48.6	1.4616	0.0149	1142	5224	99.6	1.5022	0.0134
1013	3192	23.4	1.5933	0.0302	1078	5876	50	1.4663		1143	3494	99.6	1.5827	0.0287
1014	4448	23.4	1.6060	0.0278	1079	5805	50	1.4689		1144	6145	100	1.4347	
1015	561	23.5	1.5231	0.0170	1080	3550	51.2	1.6703	0.0424	1145	6144	100	1.4366	
1016	1700	23.6	1.4464		1081	4305	53.2	1.6443	0.0439	1146	2864	100	1.4811	0.0085
1017	1482	23.6	1.4992	0.0175	1082	4447	53.5	1.5975	0.0268	1147	4947	100	1.5080	0.0060
1018	1444	24	1.5043		1083	1331	56	1.6010	0.0173	1148	3144	100	1.5345	0.0177
1019	4241	24	1.5826		1084	1251	56	1.6150	0.0225	1149	2417	100	1.6092	0.0291
1020	1701	24.3	1.4463		1085	5763	57.1	1.448	0.0084	1150	3418	100	1.6235	0.0313
1021	2289.3	24.4	1.4432	0.0083	1086	1480	57.7	1.6339	0.0305	1151	946	106.4	1.4188	0.0065
1022	3728.1	24.5	1.4877	0.0139	1087	2206	59.1	1.5532		1152	4119	107.2	1.489	0.0145
1023	4385	25	1.4555	0.0080	1088	4851	60	1.4308		1153	482	107.8	1.4161	0.0090
1024	5875	25	1.4875		1089	6147	60	1.4429		1154	3282.1	109.4	1.4482	0.0085
1025	3687	25	1.5252		1090	2263	60	1.4787	0.0228	1155	3307	110.6	1.4303	0.0077
1026	3036	25.1	1.6223	0.0302	1091	563	61	1.4953		1156	782	113	1.446	0.0097
1027	2289.2	25.2	1.4431	0.0082	1092	1858	61	1.5553	0.0246	1157	2585	114.6	1.512	0.0187
1028	1885	25.5	1.5257	0.0191	1093	1961	61.5	1.5557		1158	4652	129	1.6567	
1029	2338	26	1.4558		1094	1962	61.5	1.5577		1159	5340	130.4	1.480	0.0133
1030	4490	26	1.575	0.0205	1095	1963	61.5	1.5647		1160	2007	131.9	1.504	0.0191
1031	4226	26	1.6644		1096	2083	62.5	1.5346		1161	3938	133.3	1.422	0.0073

B. SOLIDS

I. Mean Values

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
1162	481	1.4156	1164	1578.1	1.53	1165	5664	1.635	1166	444	1.755
1163	1070.1	1.525									

II. Uniaxial Group

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
1167	55	1.484	1173	238*	1.54	1179	2174	1.569	1184	1416	1.633
1168	3973	1.497	1174	808	1.544	1180	6075	1.579	1185	2454	1.646
1169	535	1.499	1175	5002	1.545	1181	4043.1	1.581	1186	4672	1.6588
1170	3756	1.525	1176	5142.1	1.545	1182	1769.1	1.590	1187	1625	1.700
1171	2373	1.529	1177	697.1	1.554	1183	4272	1.600	1188	4727	1.717
1172	2915	1.530	1178	1093	1.559				1189	21	1.800

* Stable modification.

III. Biaxial Group

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ			α	β	γ
1190	679.1	1.367	1.409	1.536	1235	4688	1.545	1.546	1.837	1280	4330.1	1.564	1.628	
1191	361	1.4162	1.4603	1.5502	1236	786	1.547	1.547		1281	4752	1.621	1.629	1.661
1192	4184	1.402	1.463	1.617	1237	4530.1	1.548	1.548		1282	4943	1.590	1.630	1.640
1193	4218	1.407	1.468	1.620	1238	2916.1	1.550	1.550		1283	5317	1.620	1.653	1.650
1194	147	1.440	1.475	1.625	1239	853.1	1.459	1.555	1.582	1284	306		1.633	
1195	4397*		1.478		1240	988.1	1.546	1.559		1285	788		1.635	
1196	4368.3†	1.471	1.479	1.519	1241	778	1.519	1.561	1.591	1286	5317*	1.543	1.636	1.684
1197	2920		1.484		1242	4396	1.5376	1.5651	1.5705	1287	3585		1.637	
1198	238†	1.370	1.485	1.585	1243	1032	1.551	1.567	1.571	1288	5319	1.607	1.642	1.675
1199	5066.1		1.488		1244	3964		1.570		1289	5067.1	1.621	1.643	1.648
1200	2234.1		1.496		1245	1472	1.56	1.57	1.60	1290	3087	1.505	1.645	1.655
1201	4368.3†	1.479	1.496	1.524	1246	3716	1.54	1.571	1.59	1291	4750	1.587	1.646	1.769
1202	1507*	1.493	1.498	1.609	1247	5343.1	1.544	1.572		1292	1111.1	1.626	1.646	1.712
1203	2808.1	1.487	1.499	1.566	1248	1033	1.555	1.573	1.577	1293	5082.4	1.612	1.647	1.662
1204	2260.1	1.488	1.501	1.527	1249	493.1	1.515	1.575	1.586	1294	5213.1		1.650	
1205	776		1.503		1250	2199	1.560	1.576	1.647	1295	5304	1.463	1.653	1.780
1206	270	1.445	1.505	1.540	1251	5477	1.510	1.578	1.618	1296	4748	1.621	1.654	1.691
1207	996		1.509		1252	3778	1.5535	1.5787	1.5912	1297	1985	1.442	1.662	1.756
1208	994.1		1.510	1.607	1253	835	1.55	1.581		1298	5501	1.580	1.665	1.690
1209	3742		1.512		1254	708	1.549	1.583	1.625	1299	4749	1.586	1.668	1.680
1210	4008	1.505	1.512	1.524	1255	3194	1.556	1.587	1.700	1300	1987	1.479	1.669	1.734
1211	5028.1	1.511	1.512	1.836	1256	3111	1.535	1.592	1.760	1301	5428.1	1.529	1.670	1.716
1212	2260.2	1.495	1.513	1.672	1257	5228	1.522	1.594	1.616	1302	1149	1.640	1.670	1.810
1213	947.1	1.500	1.515	1.535	1258	161	1.538	1.600	1.602	1303	3539	1.493	1.675	1.739
1214	3344		1.520		1259	3222	1.550	1.600	1.680	1304	5442	1.570	1.685	1.690
1215	975.1	1.413	1.520	1.589	1260	5648	1.560	1.600	1.610	1305	1111.2	1.619	1.688	1.696
1216	5961		1.524	1.566	1261	976	1.560	1.6015	1.6187	1306	2566.2	1.597	1.692	1.806
1217	2373.1	1.528	1.529	1.537	1262	4530.2	1.602	1.602		1307	4058	1.5697	1.6935	1.7324
1218	1070.2	1.510	1.530	1.566	1263	4960	1.602	1.602		1308	84.1	1.631	1.698	1.713
1219	1672	1.523	1.531	1.534	1264	5320	1.574	1.602	1.647	1309	3103	1.479	1.710	1.810
1220	629	1.450	1.534	1.610	1265	4936.1	1.526	1.603		1310	4322	1.583	1.73	
1221	1705	1.525	1.535	1.560	1266	977	1.490	1.605	1.620	1311	445	1.490	1.743	1.872
1222	639	1.4955	1.5352	1.6045	1267	609.1	1.530	1.605	1.658	1312	4739	1.464	1.748	1.946
1223	67.1	1.4227	1.5358	1.5545	1268	3234	1.538	1.609	1.754	1313	1197	>1.56	1.75	>1.95
1224	638	1.495	1.536	1.605	1269	3208	1.600	1.610	1.675	1314	1200	1.650	1.760	1.870
1225	484	1.515	1.540	1.575	1270	1977	1.609	1.612	1.616	1315	1142	1.763	1.787	1.857
1226	5336	1.520	1.540	1.580	1271	3540	1.460	1.614	1.697	1316	87	1.740	1.847	1.863
1227	2367.1	1.536	1.540	1.541	1272	1414	1.604	1.614	1.734	1317	5818	1.524	1.867	1.873
1228	1036	1.532	1.541	1.549	1273	3732		1.615	1.650	1318	1412	1.508	1.870	1.907
1229	4394*	1.517	1.542	1.555	1274	241	1.495	1.615		1319	3060	1.535	1.873	1.893
1230	2372		1.543		1275	1415	1.578	1.620	1.627	1320	1364	1.54	>1.95	1.505
1231	1037	1.517	1.544	1.546	1276	3196	1.495	1.625	1.807					
1232	4318.1		1.545		1277	5202	1.580	1.625	1.645					
1233	303	1.4386	1.6457	1.5942	1278	5441	1.610	1.625	1.675					
1234	64.1	1.507	1.546	1.546	1279	5562	1.620	1.625	1.630					

MISCELLANEOUS

1321	5135.1		1.524 (red)		1326	5221	1.49		1.58	1331	5541	1.625		1.690
1322	5244.1	1.529	1.533 (red)		1327	1069.1	1.495		1.565	1332	5424	1.652		1.768
1323	835.1		1.564 (red)		1328	610	1.579		1.660	1333	Bolland, 67, 31: 390; 10, approximate data only.			
1324	868	1.385		1.530	1329	4500	1.583		1.747					
1325	3873*	1.480		1.522	1330	2135	1.602		1.627					

*Hydrated form.

†Metastable modification.

‡Stable modification.

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PROPERTY-SUBSTANCE TABLES

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196: 1200.2, 1560, 1772, 2050, 2643, 2851, 3302, 3311, 3758, 2203,	3291, 3767, 4849, 3754, 1318, 1688, 1792, 1873, 2497, 2580, 2740,
3786, 1200.3, 720, 2004, 3304. 197: 806, 1599, 1645, 2724, 3739,	2742, 3783, 5896, 2745. 248: 312, 802, 1811, 2472, 2787, 3590,
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3906, 2162, 2846, 3491, 548, 971, 1643, 2644, 2900, 3305, 3912,	4827, 2788, 4140, 3199, 4219. 255: 3387, 31828, 1502, 2249,
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2710, 1644, 3341. 208: 150, 561, 809, 1554, 2434, 2775, 3150,	1959. 261: 571, 1201, 4045, 4308, 3253, 3004, 3546, 3587, 3593,
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2261, 2707, 3151, 3235, 3574, 3927, 3928, 3973, 3974, 4155, 3152,	4128, 4106, 4493, 3667, 5166. 268: 31649, 31865, 2677, 3003,
3259, 3470, 2739, 4404. 213: 3356, 473, 482, 1176, 2581, 3128,	3139, 3140, 4205, 3981, 309, 2518, 4852. 270: 32114, 32606,
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1965, 1966, 2035, 2506, 2711, 3261, 3926, 3987, 4418, 1349, 2633,	4033, 4543, 5018, 1979. 271: 3770, 2073, 2367, 3774, 4062,
1249. 215: 32931, 975, 1703, 1887, 2741, 2765, 3316, 3364,	4542, 5142, 1324, 3078, 4757, 4758, 3099. 273: 3671, 4349,
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3655, 4010, 4129, 4411, 4132, 2350, 2766, 2847, 3469, 3789, 3133,	2587, 3000, 4034, 4184, 4238, 4972, 3248, 31674, 1157, 2424,
2760. 217: 3679, 405, 1205, 1316, 1553, 2507, 2716, 2717, 2748,	3652, 4267, 4304, 4296, 1415, 4359, 2423, 3702. 277: 889, 1119,
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2292, 2575, 2705, 3132, 3834, 3855, 4011, 4366, 4367, 4934, 3265,	3703, 2519, 2731, 3147. 280: 769, 1255, 1581, 2207, 2250, 2616,
1918, 2812, 2819, 3681. 219: 31796, 415, 416, 1175, 1206, 1844,	2729, 2850, 3130, 3507, 4173, 4278, 4327, 4368.2. 281: 871, 4760,
2127, 2165, 2712, 3236, 3922, 3966, 4175, 2709. 220: 3381, 3800,	3453, 1580, 3412, 3454, 3615, 4163, 4207, 4297, 4544, 4318. 283:
97, 126, 315, 316, 761, 922, 1235, 1449, 1704, 2047, 2269, 2821,	2619, 2678, 3710, 4319, 2651, 4756, 2431, 1259, 1260, 2254, 2596,
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1870, 2638. 221: 3268, 342, 399, 1204, 2490, 2492, 2714, 2762,	3508, 4268, 4299, 1416, 1258, 897, 1480, 3183, 3290, 4269, 4508,
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3267, 3967, 311, 2577, 2784, 4161, 2618, 2715, 673, 2351, 2757.	3543, 3595, 4195, 4761, 5244, 1256, 3413, 3497, 5002. 290: 346,
224: 428, 987, 2216, 2257, 3219, 3763, 3856, 3859, 4176, 5608,	3379, 515, 573, 1254, 2072, 2173, 2473, 2647, 3198, 3670, 3771,
1327. 225: 553, 1794, 2045, 2046, 2134, 2813, 3071, 3131, 3257,	4531, 4635, 4784, 4802, 5286, 5490, 5681. 291: 3255, 1926,
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2464, 2761, 2930, 3243, 3654, 3677, 3755, 4100, 4171, 4373, 4170,	4513. 294: 4322, 4381, 4997, 3230, 1478, 2648, 4158, 4439, 4762,
3679, 3239, 4367.7. 227: 86, 2084, 2294, 4388, 31677, 2255,	5160, 5017. 296: 1154, 3194, 4352, 4324, 3498, 4019, 5110, 4325,
3285, 863, 866. 228: 1498, 2051, 3240, 3680, 3683, 4097, 4138,	4793, 4225, 4017, 3115, 4362, 4777, 4939, 5340, 4507, 1273, 4266,
4172, 3313, 1868, 4177. 229: 2122, 2178, 3286, 3757, 3849, 3908,	4930. 300: 3363, 3695, 1213, 1985, 2167, 2416, 3040, 3075,
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795, 1092, 1600, 1916, 2042, 2123, 2322, 2579, 3857, 4119, 4147,	4650, 4789, 4838, 4867, 4987. 301: 1817, 3550, 5020, 3016, 1272,
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3598, 5859, 3684, 2454, 3756. 232: 125, 1058, 1872, 1917, 2498,	3883, 946, 3473, 4323, 3499, 3216, 4020, 4305, 4441, 4447. 306:
3685, 4750, 3787, 3662, 784, 3241, 4581. 233: 1744, 1810, 2293,	4018, 4448, 4794, 3551, 3196, 4708, 3466, 4240, 4846, 1419, 4988.
2864, 3191, 3264, 3663, 3847, 1237, 2503. 234: 1458, 1869, 1871,	310: 3896, 4261, 5010, 5400, 1120, 4329, 4505, 1925, 4790, 3444,
2043, 3266, 3863, 4180, 4587, 3591, 157. 235: 3384, 629, 708,	4458, 4697. 316: 31342, 31895, 1163, 1165, 1166, 1982, 4451,
2011, 2033, 2044, 2048, 2049, 2271, 2501, 2522.1, 3173, 3242,	4916, 4725, 4734, 4726. 317: 366, 1573, 1981, 2462, 5391, 4442,
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2931, 1200, 1795, 2525, 2803, 3125, 3190, 3312, 3657, 3784, 3929,	5816, 2844, 3894, 4506, 4724, 388, 5861. 325: 4393, 4687,
4090, 4099, 5021, 3237, 2899, 4367.6, 3037, 3752. 238: 265,	5037, 5072, 4994, 1110, 4243, 5059, 4727, 31679, 4220, 5607,
583, 1298, 1758, 1812, 1957, 2083, 3221, 3284, 2120, 1207, 1791,	3251, 1123. 330: 32116, 831, 4431, 5074, 5486, 4792, 4914,
2523, 3682, 2120.1, 1090, 4088, 2671. 240: 3368, 3519, 31032,	32115, 31678, 808, 1923. 335: 1922, 4915, 5044, 1525, 4203,
31180, 31513, 138, 1919, 1924, 2005, 2064, 2115, 2117, 2119,	5689, 391, 2421. 340: 3496, 31624, 1526, 4214, 4242, 4271,
2457, 2804, 3171, 3690, 3885, 4096, 4547, 5033, 5102, 31797,	4460, 5043, 5135, 5262, 4652, 32117, 4425, 4244, 4649, 4455,
1875, 3785. 241: 2125, 2544.1, 2738, 3251, 4368.8, 2052, 1217,	4728, 5168, 5335. 345: 2212, 5038, 4434, 31675, 4672, 4902,
1576, 1955, 2243, 2578, 3174, 3790, 4374, 3098, 4337. 243:	5521. 350: 4515, 5183, 5184, 5747, 4427, 4435, 4436, 3898,
1432, 1790, 2124, 2176, 2463, 2522, 2822, 2863, 3036, 3589, 4038,	4285, 4211, 4465, 5520, 5402. 360: 1991, 3042, 3307, 4437, 4622,

4676, 4912, 4913, 5193, 5491, 5746, 5616, 4287, 4892, 5281, 4012.
371: 4215, 3471, 4514, 5053, 4249, 4620, 6010, 31869, 5379,
 5887, 3882, 4907, 5173, 5306, 5055. **400:** 3958, 31798, 32959,
 4690, 3292, 4286, 5395, 3226, 32608, 389, 3480, 5494. **421:**
 392, 5883, 5274, 3716, 4626, 5863, 4722, 31075, 5172, 3316,
 5264. **452:** 5493, 3320, 4637, 4636, 5508, 31749, 3170, 3223.
500: 3322, 3769, 5817, 3224, 3228, 5695, 3227, 3678, 3271,
 32105. **600:** 3193, 31879, 3490, 3487, 3753, 3752, 3881.
707: 3272, 3832, 3495, 3749, 3696, 3700, 3703, 32936. **916:**
 3543, 3548, 3529, 3829, 3825, 3940, 3779, 31268, 32613.
1230: 3499, 33283, 32610, 3528, 3951, 33284, 32680, 33205,
 33287, 32917, 32926, 33200, 3947, 32605, 3939, 32924,
 32668, 32677, 33197. **1400:** 32499, 33196, 32131, 32671,
 32921, 32769, 32918, 31337, 31059, 31870, 31334, 32500.
1670: 32604, 32670, 31858, 3341. **3800:** 31619, 31724,
 31799, 3481, 31805, 31689, 31690.

III. DENSITY

A. Liquids

0.415: 54, 409, 3102, 1072, 1073, 3406, 1716, 1715, 980, 1713,
 1714. **0.670:** 2392, 2394, 915, 916, 2387, 1610, 3407, 2389, 917,
 2391, 1534. **0.692:** 1613, 2933, 525, 823, 918, 1617, 22, 3410,
 914, 2939, 824. **0.712:** 1619, 3409, 3414, 822, 1535, 2331, 3354,
 524, 2334, 2936, 1761, 2940, 3995. **0.724:** 2873, 3425, 1764,
 2279, 3412, 1086, 4000, 3994, 794.1, 3999, 821, 794, 1760. **0.740:**
 820, 3415, 3351, 4178, 396, 3416, 2985, 1741, 3993, 3957, 1101.
0.750: 1615, 1100, 1738, 1737, 979, 1739, 2975, 4412, 3372, 4587.
0.760: 669, 4586, 479, 2974, 4165, 2241, 2328, 2330, 2413, 1001,
 4856, 3418, 1099, 1762.1, 3323, 4012, 4411, 2869, 2973. **0.771:**
 2868, 2987, 5018, 3365, 3420, 4006, 4849, 5167, 913, 1632, 2419,
 4418, 5260, 3421, 1612, 2867. **0.781:** 3422, 208, 3423, 168,
 395, 506, 3320, 1049, 262, 792, 5156. **0.790:** 3960, 3297, 5377,
 60, 1003, 3961, 301, 667, 718, 448, 2825, 2284, 3812. **0.800:** 790,
 1769, 2281, 972, 1603, 2827, 973, 3811, 1639, 3295, 505, 3411,
 2382. **0.806:** 719, 880, 1366, 1544, 2283, 2345, 447, 791, 2955,
 1081, 1084, 1602, 2282. **0.810:** 789, 1537, 1084.1, 1630, 2327,
 2898, 2965, 1754, 3895, 3959, 1640, 1730.1, 2320, 2347, 313, 1083,
 2396, 2397, 2872. **0.817:** 717, 1078, 2403, 2897, 2960, 1005,
 1085.1, 1636, 1699, 2896, 1085, 1726, 1733.1, 2407, 2407.1, 2408,
 2968. **0.820:** 1728, 2399, 5169, 2892, 2970, 3827, 2967, 1725,
 2400.1, 2409, 2796, 2954, 2962, 3356, 1727, 1734, 3978.1. **0.825:**
 2971, 3978, 4005, 4170, 4172, 4848, 800, 2240, 2963, 2966, 2956,
 3364, 1736, 2400, 3361, 4002. **0.830:** 1469, 2797, 3826, 1547,
 1732, 1746, 2929, 4415, 237, 587, 3362, 925, 2410, 3326, 4179,
 4836, 998, 1633, 3355, 3821. **0.835:** 1098, 1629, 2239, 810, 811,
 3358, 517, 814, 837, 999, 1628, 1000, 2952, 3889, 2865, 3893.
0.840: 273, 749, 2412, 3808, 3822, 356, 1466, 3810, 3809, 3815,
 4010, 2928, 1546, 1468, 1470, 272. **0.850:** 2343, 1572, 3816,
 1063, 711, 993, 2890, 3333, 3334, 446, 1048, 3823, 3824. **0.856:**
 927, 3894, 3903, 5606, 1096, 2288, 3728.1, 1545, 3727, 5380, 3331,
 5978. **0.860:** 469, 1054, 2834, 3333.1, 3725, 3728, 3730, 3992,
 4115, 2686, 3734, 3805, 3969, 4168, 513, 3226, 3228, 3724, 4408,
 3229.1. **0.863:** 1548, 2835, 2912, 3820, 4367, 2909.1, 3223, 2685,
 3731, 3806, 5853, 2359.1. **0.866:** 801, 2112, 2357, 2901.1, 3729,
 4175, 3225, 3726, 4365.1, 2354.1, 3229, 3740.1, 3330.1, 3807,
 3899, 3988, 2359. **0.870:** 926, 1046, 1653, 4992, 5813, 2901, 748,
 1649, 1652, 1655, 1064, 1695, 2855, 2903, 3891, 798, 2355, 2683,
 747. **0.875:** 2354, 3915, 3230, 4576, 2356, 3987, 533, 2858, 3733,
 3817, 1654, 2353, 2684, 2953, 4117. **0.880:** 1365, 5003, 1658,
 3908, 3920, 1015, 1651, 3224, 4366, 1016, 1043, 1659, 3329, 4991.
0.884: 746, 4144, 4118, 4370, 1020, 3337, 4827, 1496, 2111, 3850,
 4828. **0.890:** 468, 1017, 1019, 3119, 1044, 3897, 4980, 1047, 3227,
 4376, 5001, 3303, 3918, 5141, 2415, 3917, 397, 1018, 3890, 5362,
 713, 725, 3974.1. **0.901:** 727, 3639, 3740, 3902, 4385, 4835, 5253,
 2538, 5152, 5346, 451, 4842, 4974, 2884, 3328, 4158, 5015, 3324,

4977, 1056, 4148. **0.910:** 670, 2899, 3961, 4368.8, 908, 2888,
 3913.1, 4841, 642, 2883, 2777, 3861, 1055, 2340, 4982, 5342, 5605.
0.915: 3429, 31824, 2831, 3786, 3813, 3913, 6166, 891, 2337,
 3788, 4156, 726, 3369, 2298, 4578, 4972, 1557, 3923, 3924, 4388.
0.920: 4131, 3854, 3928, 2351, 764, 2339, 2341, 3575, 938, 2299,
 3341, 5482. **0.925:** 1558, 1644, 2289, 3847, 3927, 4971, 452,
 937, 1647, 4130, 1643, 2882, 3258, 3926, 3935, 4975. **0.930:**
 2453, 2859, 4976, 4978, 3931, 671, 4843, 965, 2830, 3936, 3735,
 3764, 3789. **0.935:** 489, 799, 1519, 2861, 2201, 2810, 3922, 4157,
 4981, 569, 3260, 3787, 3859, 375, 4371, 3263, 4561. **0.94:** 2979,
 3790, 3882, 3883, 1010, 3259, 3947, 4999, 763, 1012, 2294, 3858,
 762, 978, 2386.1, 3860, 3852, 4560. **0.945:** 909, 3857, 997, 2818,
 589, 623, 3948, 724, 1541, 3244, 3267, 5005. **0.950:** 1443, 2199,
 2841, 3265, 783, 924, 1478, 1444, 3319, 3762, 3865, 3904, 4132,
 4326, 5940. **0.955:** 2775, 624, 1445, 2756, 4378, 752, 2335, 3765,
 723, 1555, 2200, 6167. **0.960:** 3753, 1554, 307, 2763, 3264, 2914,
 1553, 2722, 3121, 3655, 2778, 4089, 2365, 3246, 2840. **0.970:**
 1551, 2721, 3933, 3637, 355, 2762, 4823.1, 1595, 2758, 213, 625,
 2766, 3638, 4091.1. **0.976:** 929, 1511, 3752, 3856, 4967, 3432,
 2767, 3754.2, 5009, 3656, 1026, 2760. **0.980:** 1089, 2195, 1067.1,
 2719, 870, 3654, 4344, 2764, 3878, 930, 3661, 3763, 4579. **0.985:**
 4372, 4573, 2203, 3648, 935, 2718, 3662, 3761, 4941, 5000, 5688,
 4342. **0.990:** 934, 1482, 4161, 681, 3235.1, 400, 450, 2757, 162,
 815, 3664, 4345, 1090, 1509, 1662, 2163, 3235. **0.995:** 3311,
 403, 1070, 1510, 3236, 3573, 2204, 3243, 3574, 31, 2058, 4761.
1.000: 4095, 4097.1, 66, 3128, 4543, 5140, 5334, 258, 797, 896,
 3134, 3054, 4490, 4757, 4930, 3237, 773.1, 3747, 4147. **1.010:**
 594, 2743, 3132, 5110, 3197, 1560, 590, 2713.1, 620, 2503, 4098,
 3780, 4096, 4097, 4279, 652, 928, 2846, 2848, 2302, 2569. **1.020:**
 608.1, 795, 2570, 3701, 285, 608.2, 1442, 5371, 2322, 4994, 1328,
 1561, 3312, 4038, 4789. **1.026:** 2571, 3680, 4090.1, 619, 2567,
 3681.1, 3684, 5010, 3426, 651, 1022, 3133, 3679, 3703. **1.03:**
 3104, 1028, 3677, 3125, 3678, 218, 4939, 2161, 496, 2706, 3676,
 2568. **1.040:** 2255, 2745, 4545, 4970, 3440, 2847, 5678, 3285,
 266, 274, 2001, 2159, 720, 3154, 3286, 212, 3069, 4062. **1.050:**
 593, 3152, 3284, 358, 2812, 4350, 511, 4153, 2309, 4348, 2318,
 2748, 3192, 3872, 4093, 4383, 2189, 3149, 399. **1.061:** 2788,
 4296, 1029, 3283, 911, 4353, 616, 3135, 3191, 378, 576, 989, 1441,
 3601, 3547, 2813, 176, 1606, 458. **1.071:** 2041, 2040, 3548, 3549,
 1430, 2572, 3944, 807, 943, 969.1, 2310, 2590. **1.080:** 737, 1570,
 2039, 3667, 2588, 449, 626, 609, 3546, 968, 621, 2008, 4726, 1572.1.
1.090: 3649, 4102, 578, 1092, 1559, 2468, 2725, 420, 665, 2814,
 3037, 2589, 1889, 3591, 1357, 1483, 3642, 3036. **1.100:** 4723,
 3169.1, 4917, 471, 722, 2038, 154, 170, 1571, 4670, 247, 3688,
 4368.4, 561, 1307, 2687, 1417. **1.11:** 492, 2267, 2071, 657, 233,
 969, 4733, 264, 470, 4297.1, 672, 736, 2579, 2269. **1.121:** 1568,
 2134, 4064, 4324, 275, 2580, 5164, 520, 2509, 1341, 2669, 2849.1.
1.131: 3170, 805, 2578, 893, 4381, 3171, 46, 48, 383, 3945, 146,
 3253, 3886, 4023. **1.150:** 1756, 1388, 2127, 1390, 3439, 948,
 1917, 994, 2284.1, 3606, 658, 859. **1.160:** 2084, 3289, 3438,
 1253, 453, 2004, 460, 2499, 1252, 1692, 189, 949, 2696. **1.180:**
 3694, 887, 3798, 379, 2618, 5282, 655, 659, 2498, 1042, 3455, 334.
1.200: 1031, 2850, 1347, 1859, 227, 696, 1375, 858, 1041, 1376,
 279, 632, 710. **1.220:** 37, 384, 744, 1040, 2316, 3514, 1576, 4442,
 4441, 3435, 803, 1314, 1857, 863, 921.1, 1916. **1.252:** 190, 1856,
 515, 742, 67, 359, 2098, 741, 604, 3937, 1230, 3442, 1959, 1229.
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LIQUID CRYSTALS

H. W. FOOTE

The term "transition temperature" refers in the tables to the temperature at which the solid and crystalline-liquid phases are in equilibrium at a pressure of one atmosphere; by "melting point," is meant the corresponding temperature at which the crystalline-liquid and isotropic liquid phases are in equilibrium. In some cases, more than one stable liquid crystal phase exists, giving an additional transition temperature for each additional liquid crystal phase. These transition temperatures between two liquid crystal phases are indicated by *. In most cases, they are only approximate. Melting points which are quite uncertain, usually due to partial decomposition, have "d." written after the value. No attempt has been made to estimate the accuracy of values obtained by a single investigator, as the methods of determination are the same in nearly every case and the result obviously depends on the skill of the investigator and the purity of the compounds.

A series of apparently good determinations by different observers is apt to vary by considerably more than one degree, and it seems unlikely that any transition temperature or melting point of liquid crystals is known with an accuracy much better than one degree.

For this reason, the weighted average of a number of different determinations is usually given to the nearest whole degree. When the number of determinations is sufficient, the weighted average deviation, usually to the nearest whole degree, is given also.

The melting points of unstable liquid crystals, in monotropic systems, are not included in the tables, and transition temperatures, in the ordinary sense, do not exist in this case. Many observations on monotropic compounds will be found in nearly all the Halle dissertations and in the publications by Vorländer, which are listed at the end of the tables.

For the effect of pressure on the transition temperature and melting point of liquid crystals, see G. Hulett, 7, 28: 629; 99. For approximate data on liquid crystals of alkali salts of higher fatty acids (chiefly) see Vorländer, 25, 43: 3120; 10. For similar data regarding compounds which are optically active, see H. Stoltzenberg, Diss., Halle (1911). For qualitative data regarding liquid crystals, see E. Wolferts, Diss., Halle (09), R. Wilke, Diss., Halle (09); K. Mattenklodt, Diss., Halle (11); and Vorländer, 25, 40: 1415, 1966; 07.

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{10}H_{10}O_2$	$CH_3OC_6H_4CH:CHCOOH$	<i>p</i> -Methoxycinnamic acid.....	170 ± 1	186 ± 1	(7, 11, 30, 33, 34, 42, 43, 45)
$C_{11}H_{12}O_2$	$C_2H_5OC_6H_4CH:CHCOOH$	<i>p</i> -Ethoxycinnamic acid.....	192	197	(43)
$C_{12}H_{14}O_2$	$C_2H_5OC_6H_4CCH_2:CHCOOH$	<i>p</i> -Ethoxy- β -methylecinnamic acid....	122.5	159	(37)
$C_{14}H_{16}BrNO_2$	$BrC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Bromobenzal- <i>p</i> -aminobenzoic acid..	272	274	(12)
$C_{14}H_{16}ClNO_2$	$ClC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Chlorobenzal- <i>p</i> -aminobenzoic acid..	260	263	(12)
$C_{14}H_{16}INO_2$	$IC_6H_4CH:NC_6H_4COOH$	<i>p</i> -Iodobenzal- <i>p</i> -aminobenzoic acid....	279	287	(12)
$C_{14}H_{16}O_5$	$HOC_6H_4COOC_6H_4COOH$	<i>p</i> -(<i>p</i> -Hydroxybenzoxy)-benzoic acid..	258	266 ±	(45)
$C_{14}H_{11}NO_2$	$C_6H_5CH:NC_6H_4COOH$	Benzal- <i>p</i> -aminobenzoic acid.....	183	191	(26)
$C_{14}H_{13}N_2O_2$	$O_2NC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Nitrobenzalanisidine.....	135		(26)
$C_{14}H_{14}N_2O_2$	$CH_3OC_6H_4NONC_6H_4OCH_3$	<i>p</i> -Azoxyanisole.....	116 ± 1	135 ± 1	(1, 3, 6, 7, 9, 11, 14, 19, 23, 30, 32, 35, 36, 42, 45)
$C_{14}H_{15}N_2$	$CH_3NHC_6H_4CH:NNHC_6H_5$	<i>p</i> -Methylaminobenzalphenylhydrazone.....	170	190	(34)
$C_{14}H_{16}N_2O_2$	$CNC_6H_4CH:NC_6H_4COOH$	<i>p</i> -(<i>p</i> -Cyanobenzalamino)-benzoic acid	247	>320	(17)
$C_{14}H_{13}N_2O$	$CNC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Cyanobenzalanisidine.....	115	125	(17)
$C_{14}H_{13}N_2O$	$CH_3OC_6H_4CH:NC_6H_4CN$	Anisal- <i>p</i> -cyanoaniline.....	103	113.5	(12)
$C_{14}H_{13}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4COOH$	<i>p</i> -Acetoxiazobenzoic acid.....	254	d.	(31)
$C_{14}H_{13}O_2$	$C_6H_5C_6H_4CH:CHCOOH$	<i>p</i> -Phenylcinnamic acid.....	221	236	(2)
$C_{14}H_{13}O_2$	$C_6H_5OC_6H_4COOC_6H_4COOH$	<i>p</i> -(<i>p</i> -Methoxybenzoxy)-benzoic acid..	223	272	(45)
$C_{14}H_{13}NO_2$	$CH_3C_6H_4CH:NC_6H_4COOH$	<i>p</i> -(<i>p</i> -Methylbenzalamino)-benzoic acid	220	243	(26)
$C_{14}H_{13}NO_2$	$CH_3OC_6H_4CH:NC_6H_4COOH$	<i>p</i> -(Anisalamino)-benzoic acid.....	197	298 d.	(15, 46)
$C_{14}H_{14}N_2O_2$	$O_2NC_6H_4CH:NC_6H_4OC_6H_5$	<i>p</i> -Nitrobenzalphenetidine.....	124		(26)
$C_{14}H_{14}N_2O_2$	$CH_3OC_6H_4NONC_6H_4OC_6H_5$	<i>p</i> -Anisylazoxyphenetol.....	94 ± 1	149 ± 1	(4, 7, 32)
$C_{14}H_{17}N_2$	$C_6H_5NHC_6H_4CH:NNHC_6H_5$	<i>p</i> -Ethylaminobenzalphenylhydrazone	160	182	(34)
$C_{14}H_{13}O_4$	$CH_3COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -acetoxymbenzoate.....	228 d.	>250	(45)
$C_{14}H_{13}O_7$	$CH_3OCOOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -carbomethoxybenzoate.....	218 d.	d.	(45)
$C_{14}H_{14}N_2O$	$CNC_6H_4CH:NC_6H_4OC_6H_5$	<i>p</i> -Cyanobenzalphenetidine.....	115	132	(17)
$C_{14}H_{14}N_2O$	$C_6H_5OC_6H_4CH:NC_6H_4CN$	<i>p</i> -Ethoxybenzal- <i>p</i> -cyanoaniline.....	105	124	(12)
$C_{14}H_{14}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4CH_3$	<i>p</i> -Nitrocinnamal- <i>p</i> -toluidine.....	130	141	(26)
$C_{14}H_{14}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4OCH_3$	<i>p</i> -Nitrocinnamalanisidine.....	155	160	(26)
$C_{14}H_{14}NO_2$	$CH_3OC_6H_4CH:NC_6H_4COCH_3$	Anisal- <i>p</i> -aminoacetophenone.....	121.5	135	(15)
$C_{14}H_{14}NO_2$	$CH_3COOC_6H_4CH:NC_6H_4OCH_3$	<i>p</i> -Acetoxymbenzalanisidine.....	112	128	(15)
$C_{14}H_{14}NO_2$	$CH_3OC_6H_4CH:NC_6H_4OCOCH_3$	<i>p</i> -(Anisalamino)-phenol acetate.....	81.5	108	(15)
$C_{14}H_{14}N_2O_2$	$CH_3OC_6H_4N:NC_6H_4OC_6H_5$	<i>p</i> -Acetophenoneazophenetol.....	130		(47)
$C_{14}H_{14}N_2O_2$	$CH_3OC_6H_4CH:NN:CHC_6H_4OCH_3$	Anisaldazine.....	165 ± 3	180 ± 1	(5, 6, 7, 19)
$C_{14}H_{14}N_2O_2$	$C_6H_5OC_6H_4N:NC_6H_4OCOCH_3$	<i>p</i> -Phenetolazophenol acetate.....	121	138	(46, 47)
$C_{14}H_{14}N_2O_4$	$CH_3OC_6H_4N:NC_6H_4OCOOC_6H_5$	<i>p</i> -Anisylazocarbethoxyphenol.....	90	114	(46, 47)
$C_{14}H_{14}N_2O_2$	$C_6H_5OC_6H_4NONC_6H_4OC_6H_5$	<i>p</i> -Azoxyphenetol.....	137 ± 1	167 ± 1	(3, 14, 19, 23, 30, 32, 35, 42, 45)
$C_{14}H_{20}N_2$	$C_2H_5NHC_6H_4C_6H_4NHC_2H_5$	Diethylbenzidine.....	115.5	120.5	(34)
$C_{17}H_{18}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOH$	<i>p</i> -(Anisalamino)-cinnamic acid.....	208	d.	(15)
$C_{17}H_{18}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4OC_6H_5$	<i>p</i> -Nitrocinnamalphenetidine.....	134	137	(26)
$C_{17}H_{18}N_2O_4$	$CH_3COC_6H_4N:NC_6H_4OCOOC_6H_5$	<i>p</i> -Acetophenoneazocarbethoxyphenol	120	126	(47)
$C_{17}H_{18}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4COOC_6H_5$	Ethyl <i>p</i> -acetoxiazobenzoate.....	99	102	(31)
$C_{17}H_{18}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH_2CH_2COOH$	<i>p</i> -(Anisalamino)-hydrocinnamic acid	136	162	(45)
$C_{17}H_{18}N_2O_4$	$C_2H_5OC_6H_4N:NC_6H_4OCOOC_6H_5$	<i>p</i> -Phenetolazocarbethoxyphenol.....	96	137	(47)
$C_{18}H_{18}ClO_4$	$CH_3COOC_6H_4CH:CClC_6H_4OCOCH_3$	<i>p</i> -Dihydroxychlorostilbene diacetate..	125	138	(11, 29)
$C_{18}H_{18}N_2O_4$	$CH_3COOC_6H_4CH:NN:CHC_6H_4OCOCH_3$	Di-(<i>p</i> -acetoxymbenzalazine).....	185	192	(16, 40)
$C_{18}H_{17}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl anisal- <i>p</i> -aminocinnamate....	156	176	(43, 47)
$C_{18}H_{17}N_2O_2$	$CH_3OC_6H_4N:NC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -anisylazocinnamate.....	116, 123*	143	(46, 47)
$C_{18}H_{18}N_2O_2$	$C_2H_5OCOC_6H_4NONC_6H_4COOC_6H_5$	<i>p</i> -Azoxyethyl benzoate.....	114 ± 0.6	121 ± 0.5	(7, 11, 19, 27, 40, 42, 45)
$C_{18}H_{18}N_2O_4$	$C_2H_5OCOOC_6H_4N:NC_6H_4OCOOC_6H_5$	<i>p</i> -Azocarbethoxyphenol.....	97	118	(15)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{18}H_{18}N_2O_7$	$C_2H_5OCOOC_6H_4NONC_6H_4OCOOC_2H_5$	<i>p</i> -Azoxycarbethoxyphenol.....	95	130	(15)
$C_{17}H_{16}O_2$	$CH_3OC_6H_4CH:CHCH:CHC_6H_4OCH_3$	Di-(<i>p</i> -anisylbutadiene).....	225	238	(34)
$C_{18}H_{20}N_2O_2$	$C_2H_5OC_6H_4CH:NN:CHC_6H_4OC_2H_5$	Di-(<i>p</i> -ethoxybenzalazine).....	172	195	(13, 24, 45)
$C_{18}H_{20}N_2O_2$	$CH_3OC_6H_4C(CH_3):NN:C(CH_3)C_6H_4OCH_3$	Di-(<i>p</i> -methoxyacetophenoneazine)...	195	202	(16)
$C_{18}H_{20}N_2O_4$	$HOC_6H_4OC_6H_4CH:NN:CHC_6H_4OC_6H_4OH$	Di-(hydroxyethoxybenzalazine).....	184	207	(12)
$C_{18}H_{22}N_2O_2$	$C_2H_5OC_6H_4NONC_6H_4OC_2H_5$	Di-(<i>p</i> - <i>n</i> -propoxyazoxybenzene).....	116	122	(4, 40)
$C_{18}H_{18}N_2O_2$	$CNC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -cyanobenzal- <i>p</i> -aminocinnamate.....	131	179	(17)
$C_{18}H_{18}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -acetoxyphenylazocinnamate.....	132	152	(47)
$C_{18}H_{18}NO_2$	$CH_3C_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -methylbenzalamino)-cinnamate.....	96, 107*	118	(46, 47)
$C_{18}H_{18}NO_2$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_2COOH$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino)- α -methylcinnamic acid.....	180	265	(20)
$C_{18}H_{18}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl (<i>p</i> -anisalamino)-cinnamate....	100, 108*, 117*	138	(9, 42, 46, 47)
$C_{18}H_{18}NO_2$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate.....	132	187	(43, 47)
$C_{18}H_{22}N_2O_2$	$C_2H_5OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Phenetolazophenol <i>n</i> -valerate.....	78-83	125	(47)
$C_{20}H_{18}N_2O_2$	$CNC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Cyanobenzeneazophenol benzoate.....	181	226	(12)
$C_{20}H_{18}Br_2N_2$	$BrC_6H_4N:CHC_6H_4CH:NC_6H_4Br$	<i>p</i> -Phthalal-di-(<i>p</i> -bromoaniline).....	208	288	(17)
$C_{20}H_{14}Cl_2N_2$	$ClC_6H_4N:CHC_6H_4CH:NC_6H_4Cl$	<i>p</i> -Phthalal-di-(<i>p</i> -chloroaniline).....	176	282	(17)
$C_{20}H_{14}I_2N_2$	$IC_6H_4N:CHC_6H_4CH:NC_6H_4I$	<i>p</i> -Phthalal-di-(<i>p</i> -iodoaniline).....	262	268	(12)
$C_{20}H_{14}N_4O_4$	$O_2NC_6H_4CH:NC_6H_4N:CHC_6H_4NO_2$	(Di- <i>p</i> -nitrobenzal)- <i>p</i> -phenylenediamine.....	242	315	(46)
$C_{20}H_{16}N_2O_2$	$CH_3OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Anisylazophenol benzoate.....	159-163	178	(47)
$C_{20}H_{17}NO$	$CH_3OC_6H_4CH:NC_6H_4C_6H_5$	Anisal- <i>p</i> -aminodiphenyl.....	161	177	(12, 46)
$C_{20}H_{17}NO$	$CH_3OC_6H_4CH:NC_6H_4N:NC_6H_5$	Anisal- <i>p</i> -aminoazobenzene.....	151	182	(15, 39, 46)
$C_{20}H_{18}N_2O_6$	$CH_3OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOCH_3$	Methyl azoxycinnamate.....	221	257	(40)
$C_{20}H_{20}N_2O_2$	$CH_3OC_6H_4CH:CHCH:NN:CHCH:CHC_6H_4OCH_3$	Di- <i>p</i> -methoxycinnamicaldazine.....	210	218	(34)
$C_{20}H_{20}N_2O_4$	$C_2H_5COOC_6H_4CH:NN:CHC_6H_4OCOOC_2H_5$	Di- <i>p</i> -propionylhydroxybenzalazine..	160	187	(16)
$C_{20}H_{20}N_2O_6$	$C_2H_5OCOOC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -carbethoxyphenolazocinnamate.....	114	152	(47)
$C_{20}H_{21}NO_2$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate.....	69, 113*, 152*	159	(43, 45, 46, 47)
$C_{20}H_{21}NO_2$	$CH_3OC_6H_4CH:H_4CH:NC_6CCH_2COOC_2H_5$	Ethyl <i>p</i> -(anisalamino)- α -methylcinnamate.....	90	93	(20, 43)
$C_{20}H_{21}NO_2$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_2COOCH_3$	Methyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	105	147	(20, 43)
$C_{20}H_{24}N_2O_2$	$C_2H_5OC_6H_4CCH_2:NN:CCH_2C_6H_4OC_2H_5$	Di- <i>p</i> -ethoxyacetophenoneazine.....	142	163	(16)
$C_{21}H_{14}O_7$	$HOC_6H_4COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -hydroxybenzoxy) benzoate.....	283	d.	(45)
$C_{21}H_{16}N_2O_2$	$CH_3COC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Acetophenoneazophenol benzoate..	211 d.		(47)
$C_{21}H_{17}NO$	$C_6H_5C_6H_4CH:NC_6H_4COCH_3$	<i>p</i> -(<i>p</i> -Phenylbenzalamino)-acetophenone.....	187.5		(2)
$C_{21}H_{18}N_2O_2$	$C_2H_5OC_6H_4N:NC_6H_4OCOC_2H_5$	<i>p</i> -Phenetolazophenol benzoate.....	173	193	(46, 47)
$C_{21}H_{19}NO$	$C_2H_5OC_6H_4CH:NC_6H_4C_6H_5$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino) diphenyl..	145	184	(12)
$C_{21}H_{19}NO$	$C_6H_5C_6H_4CH:NC_6H_4OC_2H_5$	<i>p</i> -Phenylbenzal- <i>p</i> -phenetidine.....	164	189.5	(2)
$C_{21}H_{19}N_3O$	$C_2H_5OC_6H_4CH:NC_6H_4N:NC_6H_5$	<i>p</i> -(<i>p</i> -Ethoxybenzalamino)-azobenzene.....	131.5	199	(2)
$C_{21}H_{21}NO_6$	$C_2H_5OCOOC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -carbethoxyoxybenzal)-amino] cinnamate.....	80	151	(47)
$C_{21}H_{23}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	<i>n</i> -Butyl anisal- <i>p</i> -aminocinnamate....	58	76	(43)
$C_{21}H_{23}NO_2$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_2COOC_2H_5$	Ethyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	95	122 \pm 2	(9, 19, 20, 39, 43, 46)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{21}H_{21}NO_2$	$CH_3OC_6H_4CH:NC_6H_4CH:CCH_2COOC_6H_7$	<i>n</i> -Propyl <i>p</i> -(anisalamino)- α -methylcinnamate.....	50	85	(20, 43)
$C_{22}H_{14}H_4$	$CNC_6H_4N:CHC_6H_4CH:NC_6H_4CN$	<i>p</i> -Phthalal-di-(<i>p</i> -cyanoaniline).....	164	209	(12)
$C_{22}H_{17}NO_4$	$C_6H_4CH:NC_6H_4COOC_6H_4COOCH_3$	Methyl benzal- <i>p</i> -aminobenzoyl- <i>p</i> -hydroxybenzoate.....	174	177	(45)
$C_{22}H_{19}NO_2$	$C_6H_4C_6H_4CH:NC_6H_4COOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-benzoate.....	121.5	128.5	(2)
$C_{22}H_{20}N_2$	$CH_3C_6H_4CH:NC_6H_4N:CHC_6H_4CH_3$	Di-(<i>p</i> -tolual)- <i>p</i> -phenylenediamine'...	194	266	(46)
$C_{22}H_{20}N_2$	$CH_3C_6H_4N:CHC_6H_4CH:NC_6H_4CH_3$	<i>p</i> -Phthalal-di-(<i>p</i> -toluidine).....	186	238	(17)
$C_{22}H_{20}N_2$	$CH_3OC_6H_4CH:NC_6H_4N:CHC_6H_4OCH_3$	Dianisal- <i>p</i> -phenylenediamine.....	210	338	(46)
$C_{22}H_{21}N_2O_2$	$CNC_6H_4C:HNC_6H_4CH:CHCOOC_6H_{11}$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -cyanobenzalamino)-cinnamate.....	95	107	(17, 38, 46)
$C_{22}H_{21}N_2O_4$	$C_2H_5OCOCH:CHC_6H_4N:NC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -azocinnamate.....	155	230	(15, 43)
$C_{22}H_{21}N_2O_4$	$C_2H_5OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -azoxycinnamate.....	140 \pm 1	249 \pm 1	(7, 15, 25, 40, 43, 45)
$C_{22}H_{22}O_3$	$CH_3OC_6H_4CH:C_6H_4O:CHC_6H_4OCH_3$	Dianisalcyclohexanone.....	159	170	(2, 28, 44)
$C_{22}H_{24}N_2O_4$	$C_6H_4COOC_6H_4CH:NN:CHC_6H_4OCOC_6H_7$	Di- <i>p</i> -butyryloxybenzalazine.....	146	181	(16)
$C_{22}H_{25}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>act</i> -Amyl anisal- <i>p</i> -aminocinnamate..	49	90	(43)
$C_{22}H_{25}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>iso</i> -Amyl anisal- <i>p</i> -aminocinnamate..	52	90	(43)
$C_{22}H_{25}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_6H_9$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate.....	68, 88*	125	(43)
$C_{22}H_{25}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CHCOH_2COOC_6H_7$	<i>n</i> -Propyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	88	121	(20, 43)
$C_{22}H_{26}O_3$	$CH_3COOC_6H_4COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -acetoxybenzoxy)-benzoate.....	248	d.	(45)
$C_{22}H_{26}NO_3$	$C_6H_4C_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate.....	208, 216*	247	(2)
$C_{22}H_{27}NO_3$	$CH_3OC_6H_4CH:NC_6H_4COOC_6H_4COOCH_3$	Methyl <i>p</i> -(anisalamino)-benzoyl- <i>p</i> -hydroxybenzoate.....	217	300	(45)
$C_{22}H_{27}NO_4$	$CH_3OC_6H_4CH:NC_6H_4CH_2OC_6H_4COOCH_3$	Methyl <i>p</i> -(anisalamino)benzyl- <i>p</i> -hydroxybenzoate.....	157	165	(45)
$C_{22}H_{28}O_3$	$C_6H_5OC_6H_4CH:C_6H_4O:CHC_6H_4OC_6H_5$	Di-(<i>p</i> -ethoxybenzal)-cyclopentanone.	189, 194*	200	(44)
$C_{22}H_{27}NO_3$	$C_6H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate	68, 114*	121	(43)
$C_{22}H_{27}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)-cinnamate.....	81	137	(43)
$C_{22}H_{27}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_2COOC_6H_9$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	55, 65*	82	(20, 43)
$C_{22}H_{27}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CCH_2COOC_6H_{11}$	<i>act</i> -Amyl <i>p</i> -(anisalamino)- α -methylcinnamate.....	62	69	(46)
$C_{22}H_{28}O_3$	$C_2H_5OCOOC_6H_4COOC_6H_4COOC_6H_4COOH$	<i>p</i> -Hydroxybenzoic acid <i>p</i> -(<i>p</i> -carbethoxybenzoxy) benzoate.....	215	d.	(45)
$C_{22}H_{28}N_2O_4$	$C_6H_4COOC_6H_4N:NC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -benzoyloxyphenylazocinnamate.....	135	212	(47)
$C_{22}H_{28}NO_3$	$C_6H_4C_6H_4CH:NC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate.	145, 180,* 205,* 210*	219	(2, 39, 43, 46)
$C_{22}H_{28}N_2O_4$	$CH_3OC_6H_4CH:NC_6H_4CONHC_6H_4COOC_6H_5$	Ethyl <i>p</i> -(anisalamino)-benzoyl- <i>p</i> -aminobenzoate.....	212, 220*	247	(45, 46)
$C_{22}H_{24}Br_2N_2O_3$	$C_2H_5OCOCCH_2:CBBrC_6H_4NONC_6H_4CBBr:CCH_2COOC_6H_5$	Ethyl <i>p</i> -azoxy- α -methyl- β -bromcinnamate.....	110, 132*	138	(20)
$C_{22}H_{24}N_2O_2$	$C_6H_5OC_6H_4CH:NC_6H_4N:CHC_6H_4OC_6H_5$	Di-(<i>p</i> -ethoxybenzal)- <i>p</i> -phenylenediamine.....	200		(2)
$C_{22}H_{24}N_2O_2$	$C_6H_5OC_6H_4N:CHC_6H_4CH:NC_6H_4OC_6H_5$	<i>p</i> -Phthalal-di-(<i>p</i> -phenetidine).....	197	324	(17)
$C_{22}H_{24}N_2O_3$	$C_2H_5OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_6H_5$	Allyl <i>p</i> -azoxycinnamate.....	124	235	(40)
$C_{22}H_{24}N_2O_3$	$C_2H_5OCOCCH_2:CHC_6H_4NONC_6H_4CH:CCH_2COOC_6H_5$	Ethyl <i>p</i> -azoxy- α -methylcinnamate...	109, 134*	140	(20, 21)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{14}H_{16}N_2O_5$	$C_2H_5OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	<i>iso</i> -Propyl <i>p</i> -azoxycinnamate.....	150	184	(40)
$C_{14}H_{16}N_2O_5$	$C_2H_5OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	<i>n</i> -Propyl <i>p</i> -azoxycinnamate.....	123	243	(40)
$C_{14}H_{16}O_5$	$C_2H_5OC_6H_4CH:C_6H_4O:CHC_6H_4OC_2H_5$	Di-(<i>p</i> -ethoxybenzal)-cyclohexanone..	146	176	(44)
$C_{14}H_{16}N_2O_4$	$C_6H_5COOC_6H_4CH:NN:CHC_6H_4OCOC_6H_5$	Di-(<i>p</i> -valerylhydroxy)-benzalazine..	145	160	(16)
$C_{14}H_{16}N_2O_4$	$C_6H_5COOC_6H_4CH:NN:CHC_6H_4OCOC_6H_5$	Di-(<i>p</i> -isovalerylhydroxy)-benzalazine	131	156	(16)
$C_{14}H_{16}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3COOC_6H_{11}$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	86	100	(20, 43)
$C_{14}H_{16}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3COOC_6H_{11}$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -ethoxybenzalamino)- α -methylcinnamate.....	83	90	(20, 43)
$C_{15}H_{18}N_2O_3$	$C_6H_5C_6H_4N:NC_6H_4OCOC_6H_5$	<i>p</i> -Diphenylazophenol benzoate.....	194	240	(12)
$C_{15}H_{18}N_2$	$C_6H_5C_6H_4CH:NC_6H_4N:NC_6H_5$	<i>p</i> -(<i>p</i> -Phenylbenzalamino)-azobenzene	207	252	(2)
$C_{15}H_{20}O_5$	$CH_3COOC_6H_4COOC_6H_4COOC_6H_4COOC_6H_5$	Ethyl <i>p</i> -hydroxybenzoate <i>p</i> -(<i>p</i> -acetoxybenzoxy) benzoate.....	142	282	(45)
$C_{15}H_{21}NO_4$	$C_6H_5COOC_6H_4CH:NC_6H_4CH:CHCOOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -benzoxybenzalamino)-cinnamate.....	125	217	(47)
$C_{15}H_{21}NO_3$	$C_6H_5C_6H_4CH:NC_6H_4CH:CCH_3COOC_6H_5$	Ethyl <i>p</i> -(<i>p</i> -phenylbenzalamino)- α -methylcinnamate.....	120, 148*	175	(20, 43)
$C_{15}H_{21}N_2O_5$	$C_2H_5OCOCCH_3:CHC_6H_4NONC_6H_4CH:CHCOOC_2H_5$	<i>n</i> -Propyl <i>p</i> -azoxy- α -methylcinnamate	70, 125*?	128	(20)
$C_{16}H_{18}Br_2N_2$	$BrC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4Br$	Di-(<i>p</i> -bromobenzal)-benzidine.....	285	312	(12)
$C_{16}H_{18}Cl_2N_2$	$ClC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4Cl$	Di-(<i>p</i> -chlorobenzal)-benzidine.....	265	318	(12)
$C_{16}H_{18}Cl_2N_4O$	$ClC_6H_4N:CHC_6H_4NONC_6H_4CH:NC_6H_4Cl$	<i>p</i> -Azoxybenzal-di- <i>m</i> -chloraniline.....	174, 181, 198*	213	(46)
$C_{16}H_{18}I_2N_2$	$IC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4I$	Di-(<i>p</i> -iodobenzal)-benzidine.....	>300		(12)
$C_{16}H_{18}N_2O_4$	$C_6H_5COOC_6H_4N:NC_6H_4OCOC_6H_5$	<i>p</i> -Dibenzoylazophenol.....	208	250	(15, 39)
$C_{16}H_{18}N_2O_5$	$C_6H_5COOC_6H_4NONC_6H_4OCOC_6H_5$	<i>p</i> -Dibenzoylazoxyphenol.....	192	280	(15)
$C_{16}H_{18}N_4O_5$	$O_2NC_6H_4CONHC_6H_4C_6H_4NHCO-C_6H_4NO_2$	Di-(<i>p</i> -nitrobenzoyl)-benzidine.....	365	d.	(45)
$C_{16}H_{18}O_4$	$C_6H_5OCOC_6H_4C_6H_4COOC_6H_5$	Diphenyl <i>p</i> , <i>p'</i> -diphenylcarboxylate..	213	245	(45)
$C_{16}H_{20}N_2$	$C_6H_5CH:NC_6H_4C_6H_4N:CHC_6H_5$	Dibenzalbenzidine.....	234	260	(6, 24)
$C_{16}H_{20}N_2$	$C_6H_5C_6H_4CH:NN:CHC_6H_4C_6H_5$	Di- <i>p</i> -phenylbenzalazine.....	245	271	(2)
$C_{16}H_{22}N_2$	$CH_3C_6H_4CH:NC_6H_4N:CHC_6H_4CH_3$	Di- <i>p</i> -tolual-1, 5-naphthylenediamine	210	230	(46)
$C_{16}H_{22}N_2O_2$	$CH_3OC_6H_4CH:NC_6H_4N:CHC_6H_4OCH_3$	Dianisal-1, 5-naphthylenediamine..	206	313	(46)
$C_{16}H_{22}N_4O_3$	$H_2NC_6H_4CONHC_6H_4C_6H_4NHCO-C_6H_4NH_2$	Di-(<i>p</i> -aminobenzoyl)-benzidine.....	312	d.	(45)
$C_{16}H_{24}N_2O_4$	$C_6H_4(CH:NC_6H_4COOC_6H_5)_2$	Ethyl <i>p</i> -phthalal-di-(<i>p</i> -aminobenzoate).....	189	230	(17)
$C_{16}H_{18}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_6H_5$	<i>n</i> -Butyl <i>p</i> -phenylbenzal- <i>p</i> -aminocinnamate.....	167	203	(43)
$C_{16}H_{18}N_2O_5$	$C_6H_5OCOCCH_3:CHC_6H_4NONC_6H_4CH:CCH_3COOC_6H_5$	Allyl <i>p</i> -azoxy- α -methylcinnamate....	75	115	(20)
$C_{16}H_{26}N_2O_5$	$C_2H_5OCOCH_2OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOCH_2COOC_6H_5$	<i>p</i> -Azoxycinnamic acid ethyl glycolate ester.....	148	235	(40)
$C_{16}H_{20}N_2O_5$	$C_6H_5OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_6H_5$	<i>n</i> -Butyl <i>p</i> -azoxycinnamate.....	111	214	(40)
$C_{17}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>act</i> -Amyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate.....	115, 153*	180	(43)
$C_{17}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_6H_{11}$	<i>iso</i> -Amyl <i>p</i> -(<i>p</i> -phenylbenzalamino)-cinnamate.....	164, 188*	197	(43)
$C_{17}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CCH_3COC_6H_5$	<i>n</i> -Butyl <i>p</i> -(<i>p</i> -phenylbenzalamino)- α -methylcinnamate.....	99, 137*	149	(20, 43, 46)
$C_{17}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CC_2H_5COOC_6H_7$	<i>n</i> -Propyl <i>p</i> -(<i>p</i> -phenylbenzalamino)- α -ethylcinnamate.....	119	135	(20, 21, 43)
$C_{18}H_{18}O_4$	$C_6H_5COOC_6H_4C:CC_6H_4OCOC_6H_5$	Di- <i>p</i> -oxytolanediobenzoate.....	214	254	(41)
$C_{18}H_{20}N_2O_4$	$C_6H_5COOC_6H_4CH:NN:CHC_6H_4OCOC_6H_5$	Di- <i>p</i> -benzoxybenzalazine.....	227	290	(16, 40)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{28}H_{20}O_4$	$C_6H_5COOC_6H_4CH:CHC_6H_4OCOC_6H_5$	Di- <i>p</i> -hydroxystilbene dibenzoate...	224	285 d.	(41)
$C_{28}H_{24}N_2$	$(C_6H_4N:CHC_6H_4CH_2)_2$	Di-(<i>p</i> -tolual)-benzidine.....	231	>300	(6, 24)
$C_{28}H_{24}N_2O_2$	$(C_6H_4N:CHC_6H_4OCH_3)_2$	Dianisalbenzidine.....	258		(46)
$C_{28}H_{22}N_2O_4$	$C_6H_5COOC_6H_4N:NC_6H_4CH:CCH_3-$ $COOC_6H_5$	<i>act</i> -A m y l <i>p</i> -benzoylazophenol- α - methylcinnamate.....	88	120	(20)
$C_{28}H_{24}N_2O_5$	$C_6H_{11}OCOCH:CHC_6H_4NONC_6H_4-$ $CH:CHCOOC_6H_5$	<i>iso</i> -A m y l <i>p</i> -azoxycinnamate.....	144	186	(40)
$C_{28}H_{24}N_2O_6$	$C_6H_5OCOCCH_2:CHC_6H_4NONC_6H_4-$ $CH:CCH_3COOC_6H_5$	<i>iso</i> -B u t y l <i>p</i> -a z o x y- α -methylcin- namate.....	86, 110*	125.5	(20)
$C_{28}H_{24}N_2O_5$	$C_6H_5OCOCCH_2:CHC_6H_4NONC_6H_4-$ $CH:CCH_3COOC_6H_5$	<i>n</i> -Butyl <i>p</i> -azoxy- α -methylcinnamate.	60	100	(20)
$C_{30}H_{22}N_2O_3$	$C_6H_5COCH:CHC_6H_4NONC_6H_4CH:-$ $CHCOOC_6H_5$	<i>p</i> -Azoxybenzalacetophenone.....	213		(47)
$C_{30}H_{22}N_2O_2$	$(C_6H_4N:CHC_6H_4OC_2H_5)_2$	Di-(<i>p</i> -ethoxybenzal)-benzidine.....	248	>300	(13)
$C_{30}H_{22}N_2O_3$	$(C_6H_4N:CHC_6H_4CH_2OCH_3)_2$	Di-(<i>p</i> -m e t h o x y- α -methylbenzal)- benzidine.....	171	>300	(13)
$C_{30}H_{22}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CHCOOC_2H_5)_2$	E t h y l <i>p</i> -phthalal-di-(<i>p</i> -aminocin- namate).....	174, 270*	310	(17)
$C_{30}H_{50}O_2$	$C_2H_5COOC_{27}H_{45}$	Cholesterol propionate.....	97 \pm 2	112 \pm 2	(6, 10, 18, 30)
$C_{30}H_{50}O_3$	$C_2H_5OCOOC_{27}H_{45}$	Cholesterol ethyl carbonate.....	83	103.5	(8)
$C_{31}H_{52}O_2$	$C_2H_5COOC_{27}H_{45}$	Cholesterol <i>n</i> -butyrate.....	96.4	107.3	(18)
$C_{31}H_{52}O_3$	$C_2H_5OCOOC_{27}H_{45}$	Cholesterol <i>n</i> -propyl carbonate.....	99	101	(8)
$C_{32}H_{24}N_2$	$C_6H_4(N:CHC_6H_4C_6H_5)_2$	Di-(<i>p</i> -p h e n y l b e n z a l)- <i>p</i> -phenyl- enediamine.....	284	>300	(2)
$C_{32}H_{24}N_2O_4$	$C_6H_5CH:CHCOOC_6H_4CH:NN:CH-$ $C_6H_4OCOCH:CHC_6H_5$	Di-(<i>p</i> -cinnamylhydroxy)-benzalazine	206	245	(16)
$C_{32}H_{32}O_{10}$	$CH_2COOC_6H_4COOC_6H_4COOC_6H_4-$ $COOC_6H_4COOC_6H_5$	Ethyl <i>p</i> -hydroxybenzoate <i>p</i> -(<i>p</i> -(<i>p</i> - acetoxybenzoxy)benzoxy)benzoate..	187 d.	d.	(45)
$C_{32}H_{28}O$	$C_6H_5C_6H_4CH:C_6H_5O:CHC_6H_4C_6H_5$	Di-(<i>p</i> -phenylbenzal)-cyclohexanone..	236.5	237.5	(2)
$C_{32}H_{22}N_2O_2$	$C_6H_5OCH_2C_6H_4CH:NC_6H_4C_6H_4N:C-$ $HC_6H_4CH_2OC_2H_5$	Di-(<i>p</i> -ethoxy- α -m e t h y l b e n z a l)- benzidine.....	167	>300	(13)
$C_{32}H_{34}O_2$	$C_2H_5COOC_{27}H_{45}$	Cholesterol valerate.....	91.8	99.2	(18)
$C_{32}H_{34}O_3$	$C_2H_5OCOOC_{27}H_{45}$	Cholesterol <i>n</i> -butyl carbonate.....	78	90	(8)
$C_{32}H_{34}O_5$	$C_6H_5COOC_6H_4CH:C_6H_5O:CHC_6H_4O-$ COC_6H_5	Di-(<i>p</i> -benzoxybenzal)-c y c l o p e n - tanone.....	234	236	(44)
$C_{32}H_{36}O_2$	$C_6H_{11}COOC_{27}H_{45}$	Cholesterol capronate.....	91.2	100	(18)
$C_{34}H_{36}N_2O_7$	$C_6H_5COCH_2OCOCH:CHC_6H_4NON-$ $C_6H_4CH:CHCOOCH_2COC_6H_5$	Phenacyl <i>p</i> -azoxycinnamate.....	231	238	(40)
$C_{34}H_{46}N_2O_5$	$C_6H_5OCOCH:CHC_6H_4NONC_6H_4-$ $CH:CHCOOC_6H_{17}$	<i>n</i> -Octyl <i>p</i> -azoxycinnamate.....	94	175	(40)
$C_{35}H_{50}O_2$	$C_2H_5COOC_{27}H_{45}$	Cholesterol benzoate.....	146 \pm 1	178.5 \pm 0.3	(18, 22, 30, 35, 42, 45)
$C_{35}H_{46}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CHCOOC_6H_{11})_2$	<i>act</i> -A m y l <i>p</i> -phthalal-di-(<i>p</i> -aminocin- namate).....	133, 195*	268	(17)
$C_{35}H_{50}N_2O_5$	$C_6H_5OCOCCH_2:CHC_6H_4NONC_6H_4-$ $CH:CCH_3COOC_6H_{17}$	<i>n</i> -Octyl <i>p</i> -azoxy- α -methylcinnamate.	41, 62*	85	(20)
$C_{37}H_{44}O_2$	$C_6H_{11}COOC_{27}H_{45}$	Cholesterol caprinate.....	82.2	90.6	(18)
$C_{38}H_{44}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CCH_3COO-$ $C_6H_{11})_2$	<i>act</i> -A m y l <i>p</i> -phthalal-di-(<i>p</i> -amino- α - methylcinnamate).....	144, 211*	248	(17)
$C_{40}H_{38}N_2O_6$	$(C_6H_4NHCOC_6H_4N:CHC_6H_4NO_2)_2$	Di-(<i>m</i> -nitrobenzal- <i>p</i> -aminobenzoyl)- benzidine.....	>370	d.	(45)
$C_{40}H_{34}N_4$	$C_6H_5CH:NC_6H_4CH_2NHC_6H_4C_6H_4N-$ $HCH_2C_6H_4N:CHC_6H_5$	Di- <i>p</i> -(benzalamino benzyl)-benzidine.	217	246 d.	(46)
$C_{42}H_{38}N_4O_2$	$(C_6H_4NHCH_2C_6H_4N:CHC_6H_4OCH_3)_2$	Di- <i>p</i> -(anisalamino benzyl)-benzidine.	202 d.	d.	(45)
$C_{46}H_{72}N_2O_5$	$C_{16}H_{33}OCOCH:CHC_6H_4NONC_6H_4-$ $CH:CHCOOC_{16}H_{33}$	<i>n</i> -Cetyl <i>p</i> -azoxycinnamate.....	105	141	(40)
$C_{48}H_{82}N_2O_5$	$C_{16}H_{33}OCOCCH_2:CHC_6H_4NONC_6H_4-$ $CH:CCH_3COOC_{16}H_{33}$	<i>n</i> -Cetyl <i>p</i> -azoxy- α -methylcinnamate.	77	84	(20)
$C_{55}H_{90}O_2$	$C_{27}H_{48}OCOOC_{27}H_{45}$	Cholesterol carbonate.....	177	235	(8)
$C_{11}H_{12}ClHgNO$	$CH_2OC_6H_4CH:NC_6H_4HgCl$	<i>p</i> -Anisalamino phenylmercury chlor- ide.....	274	d.	(46)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{15}H_{15}ClHgN$	$C_6H_5CH:CHCH:NC_6H_5HgCl$	<i>p</i> -Cinnamalamino-phenylmercury chloride.....	255	265	(46)
$C_{15}H_{15}HgNO_2$	$CH_3OC_6H_4CH:NC_6H_5HgOCOCH_3$	<i>p</i> -Anisalaminophenylmercury acetate	177	180	(46)
$C_{25}H_{25}HgN_2O_4$	$O_2NC_6H_4CH:NC_6H_5HgC_6H_5N:CHC_6H_5NO_2$	Mercury di-(<i>p</i> -nitrobenzalamino-phenyl).....	236	241	(46)
$C_{25}H_{25}HgN_2$	$C_6H_5CH:NC_6H_5HgC_6H_5N:CHC_6H_5$	Mercury di-(benzalamino-phenyl)....	180	184	(46)
$C_{25}H_{25}HgN_2$	$Hg(C_6H_5N:CHC_6H_5CH_3)_2$	Mercury di-(<i>p</i> -tolualaminophenyl)...	217	229	(46)
$C_{25}H_{25}HgN_2O_2$	$Hg(C_6H_5N:CHC_6H_5OCH_3)_2$	Mercury di-(anisalamino-phenyl)....	209	285	(46)
$C_{30}H_{30}HgN_2$	$Hg(C_6H_5N:CHCH:CHC_6H_5)_2$	Mercury di-(cinnamalamino-phenyl)...	208	269	(46)
$C_{30}H_{30}HgN_2O_2$	$Hg(C_6H_5N:CHC_6H_5OC_2H_5)_2$	Mercury di-(<i>p</i> -ethoxybenzalamino-phenyl).....	204	272	(46)

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(For a key to the periodicals see end of volume)

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CRYSTALLOGRAPHY OF COMPOUNDS OF CARBON

GEORGE L. KEENAN AND RAYMOND M. HANN

Standard arrangement. For abbreviations, see p. 100. Literature, p. 338

B-TABLE

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.																										
16 See C-Table																																		
18 $SiC_{14}H_{14}N_4$	Silico tetraphenylamide.....	M.	Bi.	—	17° 40'		Ax. pl. b (010); $X\wedge c = 27\frac{1}{2}^\circ$ in obtuse $\angle B$	(G)																										
$SiC_{14}H_{14}$	Tetra- <i>p</i> -tolylsilicane.....	M.	Bi.	—		83° 30'	Ax. pl. $\perp b(010)$	(G)																										
$SnC_{14}H_{14}N_4Cl_4$	<i>p</i> -Toluidine tin chloride.....	M.	Bi.	+	77°		Ax. pl. $\perp b(010)$; $Z\wedge c = 19^\circ$ in obtuse $\angle B$	(G)																										
23 $PbC_2H_3O_4$	Lead formate.....	R.	Bi.	—	70° 34'		Ax. pl. b(010); $X\parallel c$	(G)																										
$PbC_4H_3O_4 \cdot 3H_2O$	Lead acetate.....	M.	Bi.	+	83° 55'		Ax. pl. b(010); $Z\wedge c = 55^\circ 18'$ in obtuse $\angle B$	(G)																										
$PbC_{11}H_{11}O_{10}S_2 \cdot 6H_2O$	Lead sulfocamphylate.....	R.	Bi.	—		78° 17'	Ax. pl. b(010); $X\parallel c$	(G)																										
27 TlC_2HO_4	Thallium acid oxalate.....	M.	Bi.	+		74° 5' (red)	Ax. pl. $\perp b(010)$	(G)																										
$TlC_2HO_4 \cdot \frac{1}{2}H_2O$	Thallium acid oxalate.....	M.	Bi.	+		106° 5' (red)	Ax. pl. b(010); $Z\wedge c = 79^\circ 36'$ (red) in obtuse $\angle B$	(G)																										
$Tl_2C_4H_4O_6$	Thallium mesotartrate.....	Tri.	Bi.	+	73° 54'			(G)																										
$Tl_2C_4H_4O_6 \cdot \frac{1}{2}H_2O$	Thallium tartrate.....	R. (?)	Bi.	—		69°	Ax. pl. b(010); $X\parallel c$	(G)																										
$TlC_2H_3O_4N_3$	Thallium picrate.....	M.	Bi.	—			Ax. pl. b(010)	(G)																										
$Tl_2C_4H_4O_6$	Thallium di-tartrate.....	M.	Bi.	+	88° 22'		Ax. pl. b(010); $Z\wedge c = 84^\circ 44'$ in obtuse $\angle B$	(G)																										
$Tl_2C_4H_4O_6$	Thallium tartrate.....	Trig.	Un.	+				(G)																										
$TlC_4H_4O_6 \cdot 8b \cdot H_2O$	Thallium antimonyl tartrate.....	R.	Bi.	—		20°–25°		(G)																										
28 $ZnC_4H_3O_4 \cdot 3H_2O$	Zinc acetate.....	M.	Bi.	+	84° 30'		Ax. pl. b(010); $Z\wedge c = 54.75^\circ$ in acute $\angle B$	(G)																										
$ZnC_4H_7O_4$	Zinc butyrate.....	M.	Bi.	+		Large		(27)																										
$ZnC_8H_{15}O_5$	Zinc methylethylvalerate.....	?	Bi.	—				(27)																										
$ZnC_4H_7O_4 \cdot Br \cdot 8H_2O$	Zinc bromomesaconate.....	M.	Bi.	—	71° 21'	118° 15'	Ax. pl. $\perp b(010)$; $X\wedge c = 14^\circ$ in obtuse $\angle B$	(G)																										
$ZnC_{10}H_6O_8S_2 \cdot 6H_2O$	Zinc naphthalene-1, 5-disulfonate.....	M.	Bi.	—	58° 16'		Ax. pl. $\parallel (010)$; $\varphi\alpha\wedge c = 74^\circ$	(41)																										
$ZnC_8H_{12}N_4I_4$	Phenyldimethylethylammonium sino iodide.....	M.	Bi.	+	86° 52'		Ax. pl. $\perp b(010)$; $Z\wedge c = 43^\circ$ in acute $\angle B$	(G)																										
$ZnC_8H_{12}ON_7Cl_4 \cdot 3H_2O$	Triacetonediamine hydrochloride sino chloride.....	M.	Bi.	+	36° 14'	58° 20'	Ax. pl. $\perp b(001)$; $Z\wedge c = 49^\circ$ in obtuse $\angle B$	(G)																										
30 $HgC_2H_5NI_2$	1, 1-Dimethylammonium mercuric iodide.....	M.	Bi.	—	Large			(16)																										
$HgC_2H_5NI_2$	1, 1-Trimethylammonium mercuric iodide.....	R.	Bi.	—	Large			(16)																										
$HgC_4H_{11}NI_2$	1, 1-Diethylammonium mercuric chloride.....	R.	Bi.	+	Very large			(16)																										
$CuC_2H_3O_4 \cdot 4H_2O$	Cupric formate.....	M.	Bi.	—	34° 54'	55° 6'	Ax. pl. b(010); $X\wedge c = 23^\circ 35'$ in obtuse $\angle B$	(G)																										
$CuC_{10}H_6O_8S_2 \cdot 6H_2O$	Copper naphthalene-1, 5-disulfonate.....	M.	Bi.	—			Ax. pl. $\parallel (010)$; $\varphi\alpha\wedge c = 75^\circ$	(14)																										
Ag 33	Al 55	As 13	Au 33	B 64	Ba 79	Be 75	Bi 15	Br 5	C 16	Ca 27	Cl 51	Cd 29	Ce 59	Co 44	Cr 46	Cu 31	Dy 67	Er 69	F 64	Fe 34	Ga 25	Gd 65	Ge 70	Gl 20	Hi 75	Hf 73	Ir 30	I 68	La 26	K 39	Li 53	Mn 55	Ni 81	Os 72

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.	
32 Ag ₂ C ₄ H ₄ O ₄ N ₄	Ethylene dicyanide silver nitrate.....	R.	Bi.	—	42° 36.5'		Ax. pl. c(001); X||b	(G)	
Ag ₂ C ₄ H ₄ O ₄ N ₄	Ethylene dicyanide silver nitrate.....	R.	Bi.	—	42° 41'		Ax. pl. c(001); X||a	(G)	
AuCl ₃ H ₂ SCl	Gold dibenzylsulfine chloride (meta-stable form)	Tet.	Un.					(G)	
AuC ₅ H ₁₂ NCl ₄	Piperidine chlorosaurate.....	R.	Bi.	+		70° 40'	Ax. pl. b(010); Z||c	(G)	
AuC ₅ H ₁₂ O ₂ NCl ₄ ·H ₂ O	δ-Aminovaleric acid chlorosaurate.....	M.	Bi.	—		70° (apprx.)	Ax. pl. ⊥b(010); X∧c = 91.5° in obtuse ∠β	(G)	
AuC ₅ H ₁₂ NCl ₄	3, 4, 5, 6-Tetramethyl-1, 2-dihydro-pyridine hydrochloride chlorosaurate	M.	Bi.	+		91° (apprx.)	Ax. pl. ⊥b(010)	(G)	
K ₂ IrC ₂ O ₄ Cl ₄ ·H ₂ O	Iridium tetrachloro tripotassium oxalate	R.	Bi.	—		94° 40'	Ax. pl. (010); Bx _a ⊥ (001)	(32)	
37 PtC ₅ H ₁₂ N ₂ Cl ₆	Methylammonium chloroplatinate.....	C.						(31)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Pyridine chloroplatinate.....	Tri.	Bi.	—		59° 54'	Ax. pl. nearly ⊥c-axis	(G)	
PtC ₅ H ₁₂ O ₂ N ₂ Cl ₆	Choline chloroplatinate.....	M.	Bi.	+		25° 52'	Ax. pl. ⊥b(010); Z∧c = 75° 12' in acute ∠β	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	α-Picoline chloroplatinate.....	M.	Bi.	—		93° 13.5'	Ax. pl. b(010)	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	1-Phenyl-3-imino-5-methyl triasoline chloroplatinate.....	M.	Bi.				Ax. pl. b(010); Z nearly ⊥c(001)	(G)	
PtC ₅ H ₁₂ O ₂ N ₂ Cl ₆ ·2H ₂ O	Pipecolinic acid chloroplatinate.....	M.	Bi.	—		66° 56'	Ax. pl. b (010)	(G)	
PtC ₅ H ₁₂ O ₂ N ₂ Cl ₆	α-Homobetaine chloroplatinate.....	M.	Bi.	+		88° 12'	Ax. pl. b(010); Z∧c = 99° in obtuse ∠β	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Ethyl pyridine chloride chloroplatinate	R.	Bi.	—		44°	Ax. pl. a(100); X||c	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Dipropyl carbinol amine chloroplatinate	M.	Bi.	—		72° 40'	Ax. pl. ⊥b(010); X nearly ⊥c(001)	(G)	
PtC ₅ H ₁₂ O ₂ N ₂ Cl ₆	Tropanine chloroplatinate.....	M.	Bi.			52° 12'	Ax. pl. ⊥b(010)	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Tropidine chloromethylate chloroplatinate	R.	Bi.	+		70°	Ax. pl. b(010); Z||c	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Ethylidipropyl ammonium chloroplatinate	R.	Bi.			61° 26'	Ax. pl. c(001); Z||a	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Anhydrolupinin chloroplatinate (stable mod.)	M.	Bi.			38° (apprx.)	Ax. pl. ⊥b(010)	(G)	
PtC ₅ H ₁₂ N ₂ Cl ₆	Diethyl-p-toluidine chloroplatinate.....	R.	Bi.	+		63° 0'	Ax. pl. a(100); Z||b	(G)	
39 RuN ₄ H ₁₂ O ₂ Cl ₆	Ruthenium ammonium chloral hydrate.	M.	Bi.			56° 20'		(L-B)	
MnCl ₃ H ₄ O ₄ N ₄ ·5H ₂ O	Manganese picrate.....	R.	Bi.	—		15° 30'	Ax. pl. b(010); X||c	(G)	
43 FeC ₁₀ H ₁₂ O ₈ N ₄ ·5H ₂ O	Ferrous picrate.....	R.	Bi.	—		24° 48'	Ax. pl. a(100); X||c	(G)	
FeC ₁₀ H ₁₂ O ₈	Ferriacetylacetone.....	R.	Bi.	—		50° (apprx.)	Ax. pl. a(100); X||c	(G)	
FeC ₁₀ H ₁₂ O ₈ ·6H ₂ O	Ferrous naphthalene-β-sulfonate.....		Bi.	+				(1)	
44 CoC ₂ H ₇ O ₄ ·4H ₂ O	Cobalt acetate.....	M.	Bi.	—		30° 43'	48° 12'	Ax. pl. b(010); X∧c = 53.5° in acute ∠β	(G)
CoC ₂ H ₇ N ₄ I ₂ ·H ₂ O	d-Luteo triethylenediamine cobalt iodide	R.	Bi.	+			Small	Ax. pl. (001); Bx _a = b-axis	(18)
CoC ₂ H ₇ N ₄ I ₂ ·H ₂ O	d-Luteo triethylenediamine cobalt iodide	R.	Bi.				Small	Ax. pl.(010); Bx _a = c-axis	(18)
CoC ₂ H ₇ O ₄ S ₂ ·6H ₂ O	Cobalt naphthalene-1, 5-disulfonate....	M.	Bi.			61° 40'	Ax. pl. ||(010); φ _a ∧c = 72° 0.5'	(41)	
NiC ₂ H ₇ O ₄ S ₂ ·6H ₂ O	Nickel naphthalene-1, 5-disulfonate....	M.	Bi.			59° 56'	Ax. pl. ||(010); φ _a ∧c = 74°	(41)	
49 UC ₂ H ₇ O ₄ N	Ammonium uranyl acetate.....	Tet.	Un.					(G)	
UCdC ₂ H ₇ O ₄ N·6H ₂ O	Cadmium uranylacetate.....	R.	Bi.	—		57° 54'	Ax. pl. a(100)	(G)	
UMnC ₂ H ₇ O ₄ N·6H ₂ O	Manganese uranyl acetate.....	R.	Bi.	—		31° (red)	Ax. pl. a(100)	(G)	
(UO ₂) ₂ CoC ₂ H ₇ O ₄ N·7H ₂ O	Cobalt diuranyl acetate.....	R.	Bi.	—		103° 30'	Ax. pl. c(001)	(G)	
55 Al ₂ C ₁₂ O ₁₈ ·18H ₂ O	Mellite.....	Tet.	Un.					(35)	
YtC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Yttrium ethyl sulfate.....	H.	Un.					(34)	
YC ₁₂ H ₁₈ O ₁₈ N ₄ S ₄ ·7H ₂ O	Yttrium m-nitrobenzenesulfonate.....	M.	Bi.	+			Ax. pl. b(010); Z∧c = 85° in obtuse ∠β	(G)	
58 LaC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Lanthanum ethyl sulfate.....	H.	Un.					(34)	
CeC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Cerium ethyl sulfate.....	H.	Un.					(34)	
60 PrC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Praseodymium ethyl sulfate.....	H.	Un.					(34)	
NdC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Neodymium ethyl sulfate.....	H.	Un.					(34)	
63 SmC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Samarium ethyl sulfate.....	H.	Un.					(34)	
EuC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Europium ethyl sulfate.....	H.	Un.					(34)	
GdC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Gadolinium ethyl sulfate.....	H.	Un.					(34)	
67 DyC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Dysprosium ethyl sulfate.....	H.	Un.					(34)	
ErC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Erbium ethyl sulfate.....	H.	Un.					(34)	
TmC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Thulium ethyl sulfate.....	H.	Un.					(34)	
YbC ₁₂ H ₁₈ O ₁₈ S ₄ ·18H ₂ O	Neoytterbium ethyl sulfate.....	H.	Un.					(34)	
75 BeC ₄ H ₈ O ₄ N ₂	Ammonium beryllium oxalate.....	M.	Bi.			27° 47'	Ax. pl. b(010); Z∧c = 37.5° in obtuse ∠β	(G)	
Be ₂ C ₄ H ₈ O ₈ S ₂ ·4H ₂ O	Diethyl beryllium sulfate (basio).....	Tet.	Un.					(24)	
MgC ₄ H ₈ O ₄ ·4H ₂ O	Magnesium acetate.....	M.	Bi.	—		56° 34'	89° 54'	Ax. pl. b(010); X∧c = 48.25° in acute ∠β	(G)
MgC ₄ H ₈ O ₈ ·2.5H ₂ O	Magnesium diacetate.....	M.	Bi.	+			79° (apprx.)	Ax. pl. b(010)	(G)
MgC ₄ H ₈ O ₈ ·6H ₂ O	Magnesium dl-tartrate.....	M.	Bi.	—			102°	Bx _a ∧c = 30° in acute ∠β	(17)
MgC ₄ H ₈ O ₈ S ₂ ·6H ₂ O	Magnesium naphthalene-1, 5-disulfonate	M.	Bi.			52° 20'	Ax. pl. ||(010); φ _a ∧c = 73° 0.5'	(41)	
77 CaC ₂ O ₄ ·H ₂ O	Calcium oxalate.....	M.	Bi.	+		89°	Ax. pl. b(010); Z∧c = 64.25° in acute ∠β	(G)	
CaC ₂ H ₄ O ₄	Calcium formate.....	R.	Bi.	+		26° 47'	41° 2'	Ax. pl. b(010); Z||a	(G)
CaC ₂ H ₄ O ₄ ·2H ₂ O(?)	Calcium malonate.....	?	Bi.	+			moderate		(37)
CaC ₂ H ₄ O ₄ ·2H ₂ O	Calcium fumarate.....	R.	Bi.	—		22° 24'	37° (apprx.)	X = a, Y = b, Z = c	(38)
CaC ₄ H ₈ O ₄ ·H ₂ O	Calcium maleate.....	R.	Bi.	—		77° 36' (calc.)	164° (calc.)	X = c, Y = a, Z = b	(38)
Mg Mn Mo N Na Nb Nd Ni O Os P Pb Pd Pr Pt Re Rh Ru S Se Sb Sn Sr Ta Tb Tl Th Ti Tm Tl U V W Y Yb Zn Zr									
76 42 47 11 82 51 61 45 1 35 12 23 41 60 37 80 34 40 39 8 63 38 56 36 51 23 38 78 52 66 10 24 19 37 70 49 60 48 57 71 28 22									

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	Sr	Ta	Tb	Ti	Th	Tl	Tm	U	V	W	Yb	Zn	Zr			
76	43	47	11	33	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	15	23	78	52	66	10	24	19	27	70	49	50	48	57	71	28	21

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
$\text{CaC}_4\text{H}_4\text{O}_8 \cdot 3\text{H}_2\text{O}$	Calcium malate.....	R.	Bi.	+			Ax. pl. b(010); Z||a	(37)
$\text{CaC}_4\text{H}_4\text{O}_8 \cdot 3\text{H}_2\text{O}$	Calcium succinate.....	?	Bi.			Very large		(37)
$\text{CaC}_4\text{H}_4\text{O}_8 \cdot 3\text{H}_2\text{O}$	Calcium mesotartarate.....	M.	Bi.	-(?)		Very large	Ax. pl. b(010)	(G, 37)
$\text{CaC}_5\text{H}_{10}\text{O}_4$	Calcium crotonate.....	(?)	Bi.	-				(37)
$\text{CaC}_5\text{H}_{10}\text{O}_8 \cdot 6\text{H}_2\text{O}$	Calcium acid malate.....	R.	Bi.	+		109° 6' (red)	Ax. pl. a(100); Z||c	(G)
$\text{Ca}_2\text{C}_{12}\text{H}_{10}\text{O}_{12}$	Calcium aconitate.....	?	Bi.			100° (apprx.)		(37)
$\text{Ca}_2\text{C}_{12}\text{H}_{10}\text{O}_{14} \cdot 4\text{H}_2\text{O}$	Calcium citrate.....	?	Bi.					(37)
$\text{CaC}_5\text{H}_8\text{O}_{10} \cdot \text{N}_2 \cdot (?)\text{H}_2\text{O}$	Calcium nitrotetrate(?).....	M.	Bi.		32° 26'		Ax. pl. \perp b(010); Z nearly \perp a (100)	(G)
$\text{Ca}_2\text{PbC}_{15}\text{H}_{20}\text{O}_{15}$	Dicalcium lead propionate.....	Tet.	Un.	+				(G)
$\text{CaPbC}_{22}\text{H}_{100}\text{O}_{50} \cdot 12\text{H}_2\text{O}$	Tetracalcium butyrate pentalead propionate.....	C.						(G)
$\text{CaCuC}_6\text{H}_{12}\text{O}_8 \cdot 6\text{H}_2\text{O}$	Calcium cupric acetate.....	Tet.	Un.					(G)
78 $\text{SrC}_2\text{H}_2\text{O}_4$	Strontium formate.....	R.	Bi.	+	74° 14'	143° 36'	Ax. pl. a(100); Z||b	(G)
$\text{SrC}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Strontium formate.....	R.	Bi.	-	66° 59.33'	114° 8'	Ax. pl. b(010); X||c	(G)
$\text{SrC}_2\text{H}_2\text{O}_8 \cdot \text{S}_2 \cdot \text{H}_2\text{O}$	Strontium disulfonate.....	M.	Bi.			Large	Ax. pl. \perp (010)	(6)
$\text{SrC}_4\text{H}_{10}\text{O}_8 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Strontium ethyl sulfate.....	M.	Bi.		75° 4'		Ax. pl. \perp b(010); Z||c = 70° in acute $\angle\beta$	(G)
$\text{SrC}_4\text{H}_8\text{O}_{10} \cdot (?)\text{H}_2\text{O}$	Strontium nitrotetrate.....	M.	Bi.		30° 23'		Ax. pl. b(010); X \perp a(100)	(G)
$\text{SrC}_4\text{H}_8\text{O}_{10} \cdot \text{Sb}_2$	Strontium antimonyl tartrate.....	H.	Un.	-				(G)
$\text{Sr}_2\text{CuC}_4\text{H}_4\text{O}_8 \cdot 8\text{H}_2\text{O}$	Cupric strontium formate.....	Tri.	Bi.		72° 4'			(L-B)
$\text{SrCa}_2\text{C}_{15}\text{H}_{30}\text{O}_{15}$	Dicalcium strontium propionate.....	Tet.	Un.	+				(G)
79 $\text{BaC}_2\text{H}_2\text{O}_4$	Barium formate.....	R.	Bi.	+	77° 54.33'		Ax. pl. b(010); Z||a	(G)
$\text{BaC}_4\text{H}_4\text{O}_8 \cdot 5\text{H}_2\text{O}$	Barium dl-tartrate.....	M.	Bi.	+	93° 1'		Ax. pl. \perp b(010)	(G)
$\text{BaC}_4\text{H}_4\text{O}_8 \cdot \text{H}_2\text{O}$	Barium acetate.....	Tri.	Bi.					(18)
$\text{BaC}_4\text{H}_{10}\text{O}_8 \cdot \text{H}_2\text{O}$	Barium propionate.....	R.	Bi.	-	81° 36'		Ax. pl. a(100); X||b	(G)
$\text{BaC}_{12}\text{H}_{22}\text{O}_{14} \cdot (?)\text{H}_2\text{O}$	Barium d-galactonate.....	M.	Bi.			77° 37'	Ax. pl. \perp b(001); Z||b	(G)
$\text{BaC}_4\text{H}_{10}\text{O}_8 \cdot 4\text{H}_2\text{O}$	Barium methylvinate.....	R.	Bi.		88° 12'		Ax. pl. a(100); Z||b	(G)
$\text{BaC}_4\text{H}_8\text{O}_8 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Barium m-benzenedisulfonate.....	R.	Bi.		62° 19' (red)		Ax. pl. a(100); Z||c	(G)
$\text{BaC}_4\text{H}_4\text{O}_8 \cdot \text{S}_2 \cdot 4\text{H}_2\text{O}$	Barium phenol-2, 4-disulfonate.....	M.	Bi.	-	61° 58'		Ax. pl. ||a(100); X \wedge c = 5° 20' in acute $\angle\beta$	(G)
$\text{BaC}_2\text{H}_2\text{N}_2 \cdot 3.5\text{H}_2\text{O}$	Barium tetrazole.....	R.	Bi.			40° (apprx.)	Ax. pl. a(100); Z||c	(G)
$\text{BaC}_6\text{H}_7\text{O}_9 \cdot \text{N}_2 \cdot \text{S} \cdot 3.5\text{H}_2\text{O}$	Barium dinitrophenol sulfonate.....	M.	Bi.	-		72° 13'	Ax. pl. b(010); X \wedge c = 77° in acute $\angle\beta$	(G)
$\text{BaC}_6\text{H}_7\text{O}_9 \cdot \text{N}_2 \cdot 2\text{H}_2\text{O}$	Barium methyloxamine.....	M.	Bi.	+		40° (apprx.)	Ax. pl. b(010); Z \wedge c = 8° in obtuse $\angle\beta$	(G)
$\text{BaC}_{10}\text{H}_{10}\text{O}_4 \cdot \text{N}_4 \cdot 1.5\text{H}_2\text{O}$	Barium methylpyrazole carbonate.....	Tri.	Bi.		56° 42'		Ax. pl. \perp b(010)(apprx.)	(G)
$\text{BaC}_4\text{H}_{12}\text{O}_8 \cdot \text{P}_2 \cdot 2\text{H}_2\text{O}$	Barium diacetonephosphinate.....	R.	Bi.	+		122° 44'	Ax. pl. \perp (010); Z||c	(G)
$\text{BaC}_6\text{H}_{10}\text{O}_9 \cdot \text{N}_2 \cdot \text{S}_2$	Barium p-amidobenzophenone-p-sulfonate.....	M.					Ax. pl. ||(010)	(5)
$\text{BaCdC}_4\text{H}_4\text{O}_8 \cdot 2\text{H}_2\text{O}$	Barium cadmium formate.....	M.	Bi.	+	67° 36'	117°	Ax. pl. \perp b(010); Z \wedge c = 46° 23' in acute $\angle\beta$	(G)
$\text{Ba}_2\text{CuC}_6\text{H}_8\text{O}_{12}$	Barium copper formate.....	R.	Bi.	+		79°	Ax. pl. b(010)	(G)
$\text{BaCa}_2\text{C}_{15}\text{H}_{30}\text{O}_{15}$	Dicalcium barium propionate.....	C.						(G)
81 $\text{LiC}_4\text{H}_4\text{O}_8 \cdot 5\text{H}_2\text{O}$	Monolithium malate.....	M.	Bi.	-		100°	Ax. pl. b(010)	(G)
$\text{Li}_2\text{C}_{10}\text{H}_8\text{O}_8 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Lithium naphthalene-1, 5-disulfonate.....	M.	Bi.		23°		Ax. pl. \perp (010)	(41)
$\text{LiC}_4\text{H}_4\text{O}_8 \cdot \text{N} \cdot \text{H}_2\text{O}$	Ammonium lithium tartrate.....	R.	Bi.	+	87° 6'			(G)
$\text{LiC}_4\text{H}_8\text{O}_8 \cdot \text{N} \cdot \text{H}_2\text{O}$	Lithium ammonium dl-tartrate.....	M.	Bi.	+	81° 42'		Ax. pl. b(010); Z \wedge c = 76.5° in obtuse $\angle\beta$	(G)
$\text{LiTiC}_4\text{H}_4\text{O}_8 \cdot \text{H}_2\text{O}$	Lithium thallium tartrate.....	R.	Bi.	+		24° 40' (red)	Ax. pl. c(001)(red); Z||b	(G)
$\text{Li}_2\text{Cr}_2\text{C}_{12}\text{O}_{24} \cdot 18(?)\text{H}_2\text{O}$	Lithium chromic oxalate.....	R.	Bi.	-		95° 26'	Ax. pl. b(010); X||c	(G)
$\text{LiUO}_2\text{C}_6\text{H}_8\text{O}_{10} \cdot 5\text{H}_2\text{O}$	Lithium uranyl acetate.....	M.	Bi.	-		65° 14'	Ax. pl. b(010); X \wedge c = 12° in obtuse $\angle\beta$	(G)
$\text{Li}_2\text{Al}_2\text{C}_{12}\text{O}_{24} \cdot 12\text{H}_2\text{O}$	Lithium aluminium oxalate.....	Tri.	Bi.	-		100° 30'	Ax. pl. \perp b(010)	(G)
82 $\text{NaC}_2\text{H}_3\text{O}_3 \cdot 3\text{H}_2\text{O}$	Sodium acetate.....	M.	Bi.	-	62° 50'		Ax. pl. \perp b(010); X \wedge c = 44° in acute $\angle\beta$	(G)
$\text{NaC}_3\text{H}_2\text{O}_4 \cdot \text{H}_2\text{O}$	Sodium acid malonate.....	R.	Bi.	-	39° 20'	55° 21'	Ax. pl. a(100); X||c	(G)
$\text{NaC}_4\text{H}_4\text{O}_8 \cdot \text{H}_2\text{O}$	Sodium dl-tartrate.....	R.	Bi.	+	51° 31' (red)	83° 34' (red)	Ax. pl. a(100); Z||c	(G)
$\text{NaC}_4\text{H}_7\text{O}_4$	Sodium diacetate.....	C.						(G)
$\text{NaC}_4\text{H}_4\text{O}_4$	Sodium citraconate.....	M.	Bi.	-	53° 25' (red)		Ax. pl. b(010)	(G)
$\text{NaC}_8\text{H}_8\text{O}_4$	Sodium acid phthalate.....	R.	Bi.			30° (apprx.)	Ax. pl. c(001)	(G)
$\text{NaC}_{10}\text{H}_{10}\text{O}_4 \cdot 3.5\text{H}_2\text{O}$	Sodium santonate.....	R.	Bi.	-		51° 46'	Ax. pl. a(100); X||b	(G)
$\text{NaC}_{10}\text{H}_{10}\text{O}_4 \cdot 3\text{H}_2\text{O}$	Sodium hydrosantonate.....	R.	Bi.	+		37° 24' (red)	Ax. pl. a(100); Z||c	(G)
$\text{NaC}_6\text{H}_4\text{O}_6 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Sodium p-phenolsulfonate.....	M.	Bi.	+	69° 58'	125° 47'	Ax. pl. b(010); Z \wedge c = 9° in obtuse $\angle\beta$	(G)
$\text{NaC}_7\text{H}_5\text{O}_6 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Sodium m-sulfobenzoate.....	Tri.	Bi.	-		86° 7'	X \perp b(010)	(G)
$\text{NaC}_8\text{H}_8\text{O}_6 \cdot \text{S}_2$	Sodium p-xylenesulfonate.....	R.	Bi.	-		27° 46'	Ax. pl. c(001); X||b	(G)
$\text{Na}_2\text{C}_2\text{H}_4\text{O}_4 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Sodium ethane disulfonate.....	M.	Bi.			Large	Ax. pl. (010)	(6)
$\text{Na}_2\text{C}_{10}\text{H}_8\text{O}_8 \cdot \text{S}_2 \cdot 2\text{H}_2\text{O}$	Sodium naphthalene-1, 5-disulfonate.....	M.	Bi.	-	24° 0.5'		Ax. pl. \perp (010)	(41)
$\text{Na}_2\text{C}_2\text{H}_2\text{O}_4 \cdot \text{N}_4$	Sodium diisonitramidomethane.....	M.	Bi.	-	89° 20'		Ax. pl. b(010); X \wedge c = 43.66° in acute $\angle\beta$	(G)

Ag Al As Au B Ba Be Bi Br C Ca Ch Cd Ce Cl Co Cr Cs Cu Dy Er Eu F Fe Ga Gd Ge Gl H Hf Hg He I In K La Li Lu Mn Mo Nb Ni Np O Os Pt Pb Po Pr Rb Rh Ru S Se Sb Sn Sr Ta Te Th Ti Tl U V Vb W Xe Y Yb Zn Zr

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
$\text{NaC}_4\text{H}_5\text{O}_4\text{N.H}_2\text{O}$	Sodium aspartate.....	M.	Bi.	—		31° 30'	Ax. pl. b(010); $Z \wedge c = 51^\circ$ in acute $\angle\beta$	(G)
$\text{NaC}_4\text{H}_5\text{O}_4\text{N.H}_2\text{O}$	Sodium ammonium <i>dl</i> -tartrate.....	M.	Bi.	—	44° 20'		Ax. pl. $\perp b(010)$	(G)
$\text{NaC}_4\text{H}_5\text{O}_4\text{N.4H}_2\text{O}$	Sodium ammonium tartrate.....	R.	Bi.	—	59° 52'	96° 30'	Ax. pl. a(100); $X \parallel c$	(G)
$\text{NaTlC}_4\text{H}_4\text{O}_4.4\text{H}_2\text{O}$	Sodium thallium tartrate.....	R.	Bi.	—		75° 49'-76° 47' (red)	Ax. pl. a(100); $X \parallel c$	(G)
$\text{NaC}_4\text{H}_5\text{O}_4\text{N}$	Sodium acid glutamate.....	M.	Bi.	—	63° 3.5'		Ax. pl. $\perp b(010)$; $Z \perp \gamma(10\bar{2})$	(G)
$\text{NaC}_4\text{H}_5\text{O}_4\text{NS.2H}_2\text{O}$	Sodium sulfanilate.....	R.	Bi.	+	65° 24'	115° 24'	Ax. pl. b(010); $Z \parallel c$	(G)
$\text{NaC}_{10}\text{H}_7\text{O}_4\text{NS.4H}_2\text{O}$	Sodium naphthalenesulfonate (stable)...	M.	Bi.	+	69° 10'		Ax. pl. b(010); $Z \wedge c = 3^\circ 35'$ in acute $\angle\beta$	(G)
$\text{NaTl}_2\text{C}_4\text{H}_4\text{O}_4$	Sodium trithallium tartrate.....	R.	Bi.	+		75° 40'	Ax. pl. c(001); $Z \parallel b$	(G)
$\text{NaCuC}_4\text{H}_4\text{O}_4.9\text{H}_2\text{O}$	Sodium cupric triuranil acetate.....	M.	Bi.	+		90° 50'	Ax. pl. $\perp b(010)$	(G)
$\text{Na}_4\text{Fe}_3\text{C}_{12}\text{O}_{34}.10\text{H}_2\text{O}$	Sodium ferric oxalate.....	M.	Bi.	—	30° 0'	46° 53'	Ax. pl. b(010); $X \wedge c = 12^\circ$ in obtuse $\angle\beta$	(G)
$\text{Na}_2\text{Cr}_2\text{C}_{12}\text{H}_{12}\text{O}_{34}.7\text{H}_2\text{O}$	Sodium ammonium chromic oxalate.....	M.	Bi.	—		98° 20'	Ax. pl. $\perp (010)$	(G)
$\text{NaUC}_4\text{H}_4\text{O}_4$	Sodium uranyl acetate.....	C.						(G)
$\text{NaU}_2\text{MnC}_{12}\text{H}_{12}\text{O}_{34}.9\text{H}_2\text{O}$	Sodium manganese triuranil acetate.....	M.	Bi.	—		105° 30'	Ax. pl. $\perp b(010)$; $X \wedge c = 70.5^\circ$ in obtuse $\angle\beta$	(G)
$\text{Na}_2\text{Al}_2\text{C}_4\text{H}_4\text{O}_4.7\text{H}_2\text{O}$	Sodium ammonium aluminium oxalate.....	M.	Bi.	—		134°	Ax. pl. $\perp b(010)$; $X \wedge c = 76^\circ$ in obtuse $\angle\beta$	(G)
$\text{Na}_2\text{Al}_2\text{C}_{12}\text{H}_{12}\text{O}_{34}.7\text{H}_2\text{O}$	Sodium ammonium aluminium oxalate.....	M.	Bi.	—				(21)
$\text{Na}_4\text{Al}_2\text{C}_{12}\text{O}_{34}.10\text{H}_2\text{O}$	Sodium aluminium oxalate.....	M.	Bi.	—		83° 30'	Ax. pl. b(010); $X \wedge c = 7.5^\circ$ in obtuse $\angle\beta$	(G)
$\text{Na}_{24}\text{Al}_{12}\text{C}_{12}\text{H}_{12}\text{O}_{34}.9\text{H}_2\text{O}$	Ammonium sodium aluminium oxalate.....	Tri.	Bi.	—		138°	Ax. pl. $\perp (001)$; $Bx_a \perp (001)$	(21)
$\text{NaLiC}_4\text{H}_4\text{O}_4.2\text{H}_2\text{O}$	Sodium lithium <i>dl</i> -tartrate.....	M.	Bi.	—	68° 57' (red)		Ax. pl. b(010); $X \wedge c = 34.5^\circ$ in obtuse $\angle\beta$	(G)
83 $\text{K}_2\text{C}_2\text{O}_4.\text{H}_2\text{O}$	Potassium oxalate.....	M.	Bi.	—	82°	156°	Ax. pl. b(010); $X \wedge c = 40^\circ 45'$ in obtuse $\angle\beta$	(G)
$\text{KC}_2\text{H}_2\text{O}_4$	Potassium acid oxalate.....	M.	Bi.	—	40°	64°	Ax. pl. $\perp b(010)$; $X \perp c(100)$	(G)
$\text{KC}_2\text{H}_2\text{O}_4.\text{H}_2\text{O}$	Potassium acid oxalate.....	R.	Bi.	—		75° 40'	Ax. pl. c(001); $X \parallel b$	(G)
$\text{KC}_4\text{H}_2\text{O}_4$	Potassium acid succinate.....	M.	Bi.	—		113°	Ax. pl. $\perp b(010)$	(G)
$\text{KC}_4\text{H}_2\text{O}_4.2\text{H}_2\text{O}$	Potassium acid succinate.....	R.	Bi.	—			Ax. pl. c(001); $Z \parallel a$	(G)
$\text{KC}_4\text{H}_2\text{O}_4$	Potassium acid tartrate.....	R.	Bi.	—		161° 40'	Ax. pl. c(001); $X \parallel b$	(G)
$\text{KC}_4\text{H}_{11}\text{O}_4$	Potassium acid disuccinate.....	M.	Bi.	—		122° 50'	Ax. pl. $\perp b(010)$; $X \wedge c = 44^\circ$ in obtuse $\angle\beta$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_4.3\text{H}_2\text{O}$	Potassium tartrate.....	M.	Bi.	—	62°	102° 16' (red)	Ax. pl. $\perp b(010)$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_4.2\text{H}_2\text{O}$	Potassium <i>dl</i> -tartrate.....	M.	Bi.	—		130° 2' (red)		(G)
$\text{K}_2\text{C}_4\text{H}_2\text{O}_{12}.2\text{H}_2\text{O}$	Potassium tetraoxalate.....	R.	Bi.	—			$Bx_a \perp (001)$	(12)
$\text{K}_2\text{C}_4\text{H}_2\text{O}_{12}.9\text{H}_2\text{O}$	Potassium mellitate.....	R.	Bi.	—		73° 30'	Ax. pl. b(010); $X \parallel c$	(G)
$\text{KCH}_2\text{O}_4\text{S}$	Potassium formaldehyde sulfite.....	M.	Bi.	+		98° 18'	Ax. pl. b(010)	(G)
$\text{KC}_4\text{H}_4\text{O}_4\text{S}$	Potassium phenolsulfonate.....	R.	Bi.	+	69° 4' (apprx.)		Ax. pl. c(001); $Z \parallel b$	(G)
$\text{KC}_4\text{H}_4\text{O}_4\text{S.2H}_2\text{O}$	Potassium phenolsulfonate.....	R.	Bi.	+			Ax. pl. a(100); $Z \parallel c$	(G)
$\text{KC}_4\text{H}_4\text{O}_4\text{S}$	Potassium phenylsulfate.....	R.	Bi.	+		87° 58'	Ax. pl. b(010); $Z \parallel c$	(G)
$\text{KC}_7\text{H}_4\text{O}_4\text{S.H}_2\text{O}$	Potassium <i>p</i> -toluenesulfonate.....	R.	Bi.	—	67° 4'		Ax. pl. a(100); $X \parallel b$	(G)
$\text{K}_2\text{CH}_2\text{O}_4\text{S}_2$	Potassium methanedisulfonate.....	M.	Bi.	—	72°		Ax. pl. $\perp b(010)$; $Z \wedge c = 41^\circ$ in obtuse $\angle\beta$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_4\text{S}_2.\text{H}_2\text{O}$	Potassium <i>m</i> -benzenedisulfonate.....	M.	Bi.	—		96° (apprx.)	Ax. pl. $\perp b(010)$	(G)
$\text{K}_2\text{C}_4\text{H}_4\text{O}_4\text{S}_2.\text{H}_2\text{O}$	Potassium phenoldisulfonate.....	R.	Bi.	—	65° 35'		Ax. pl. b(010); $X \parallel a$	(G)
$\text{KC}_4\text{H}_4\text{O}_4\text{S}_2\text{Cl}$	Potassium <i>p</i> -chlorobenzenedisulfonate.....	M.	Bi.	—	81° 25' (red)		$Z \parallel b$	(G)
$\text{K}_2\text{C}_{10}\text{H}_4\text{O}_4\text{S}_2.2\text{H}_2\text{O}$	Potassium naphthalene-1, 5-disulfonate...	M.	Bi.	—	38° 50'		Ax. pl. $\perp (010)$; $\gamma \wedge c = 78^\circ$	(41)
$\text{KC}_4\text{H}_4\text{O}_4\text{N}$	Potassium phthalamine.....	R.	Bi.	—		21° 2'	Ax. pl. b(010); $X \parallel a$	(G)
$\text{KC}_7\text{H}_4\text{O}_4\text{N}_2$	Potassium 3, 5-dinitrobenzoate.....	M.	Bi.	—		55° 25'	Ax. pl. b(010); $X \wedge c = 65^\circ$ in acute $\angle\beta$	(G)
$\text{KC}_4\text{H}_4\text{O}_4\text{N}_2$	Potassium picrate.....	R.	Bi.	—	33° 34'	67° 39'	Ax. pl. a(100); $X \parallel c$	(G)
$\text{KC}_4\text{H}_4\text{N}_4\text{O}_4$	Potassium acid uroanate.....	R.	Bi.	—				(21)
$\text{KC}_4\text{H}_4\text{O}_4\text{Sb.H}_2\text{O}$	Potassium antimonyl tartrate.....	R.	Bi.	—	42° 34'	72° 50'	Ax. pl. c(001); $X \parallel b$	(G)
$\text{K}_2\text{IrC}_4\text{O}_4\text{Cl}_2.\text{H}_2\text{O}$	Potassium iridium chloroxalate.....	M.	Bi.	+	76° 23'		Ax. pl. b(010); $Z \wedge c = 13^\circ 53'$ in obtuse $\angle\beta$	(G)
$\text{K}_2\text{PtC}_2\text{O}_4\text{N}_2.\text{H}_2\text{O}$	Potassium platinum nitrito oxalate.....	M.	Bi.	—	89° 40'		Ax. pl. $\perp b(010)$	(G)
$\text{K}_2\text{Fe}_2\text{C}_{12}\text{O}_{34}.6\text{H}_2\text{O}$	Potassium ferric oxalate.....	M.	Bi.	—	80° 4' (red)		Ax. pl. b(010); $X \wedge c = 1.25^\circ$ in obtuse $\angle\beta$	(G)
$\text{K}_2\text{NiC}_4\text{O}_4\text{S}_4$	Potassium nickel dithioxalate.....	M.	Bi.	—				(27)
$\text{KCaC}_4\text{H}_4\text{O}_{17}\text{Sb}_2\text{N.H}_2\text{O}$	Calcium antimonyl tartrate potassium nitrate	R.	Bi.	—		64° 1'	Ax. pl. a(100); $Z \parallel b$	(G)
$\text{KLiC}_4\text{H}_4\text{O}_4\text{S}_2.\text{H}_2\text{O}$	Lithium potassium ethanedisulfonate...	M.	Bi.	—		82°	Ax. pl. (010); $Bx_a \perp (001) = 41^\circ$ in obtuse $\angle\beta$	(6)
$\text{KLiC}_4\text{H}_4\text{O}_4.\text{H}_2\text{O}$	Lithium potassium tartrate.....	R.	Bi.	—	73° 58'		Ax. pl. b(010); $X \parallel a$	(G)
$\text{KNaC}_4\text{H}_4\text{O}_4.4\text{H}_2\text{O}$	Sodium potassium tartrate.....	R.	Bi.	+	69° 40'	117° 2'	Ax. pl. b(010); $Z \parallel a$	(G)
$\text{KNaC}_4\text{H}_4\text{O}_4\text{SbN.H}_2\text{O}$	Potassium antimonyl tartrate sodium nitrate	R.	Bi.	—		90° 45'	Ax. pl. c(001); $X \parallel a$	(G)
$\text{KNaC}_4\text{H}_4\text{O}_4\text{SbN.2H}_2\text{O}$	Potassium antimonyl tartrate sodium nitrate	R.	Bi.	—		88° 37'	Ax. pl. b(010); $X \parallel c$	(G)
$\text{K}_2\text{NaIrC}_2\text{O}_4\text{Cl}_2.2\text{H}_2\text{O}$	Potassium sodium iridium chloronitrito oxalate	R.	Bi.	+		63° 24'	Ax. pl. a(100); $Z \parallel b$	(G)

Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O	Os	P	Pb	Pd	Pr	Pt	Ra	Rb	Rh	Ru	S	Sa	Sb	Se	Si	Sn	St	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	
76	42	47	11	82	51	61	45	1	35	12	23	41	60	37	80	84	40	39	8	63	14	56	9	18	22	78	62	66	10	24	19	27	70	49	50	48	57	71	28	21

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
84 $\text{Rb}_2\text{C}_4\text{H}_4\text{O}_8 \cdot 2\text{H}_2\text{O}$	Rubidium <i>dl</i> -tartrate.....	M.	Bi.	—	56° 6'		Ax. pl. b(010); $X \wedge c = 82^\circ 18'$ in acute $\angle \beta$	(G)
$\text{Rb}_2\text{C}_4\text{H}_4\text{O}_8 \cdot \text{H}_2\text{O}$	Rubidium mesotartrate.....	Tri.	Bi.	—	75° 18'		Ax. pl. 19° with <i>c</i> -axis	(G)
$\text{Rb}_2\text{Al}_2\text{C}_4\text{O}_{10} \cdot 6\text{H}_2\text{O}$	Rubidium aluminium oxalate.....	M.	Bi.	—	80° 22'		Ax. pl. (010)	(G)
$\text{RbLiC}_4\text{H}_4\text{O}_8 \cdot \text{H}_2\text{O}$	Lithium rubidium tartrate.....	R.	Bi.	—	57° 10' (red)		Ax. pl. c(001); $X \parallel a$	(G)
$\text{Rb}_2\text{Na}_3\text{Cr}_2\text{C}_4\text{O}_{14} \cdot 7\text{H}_2\text{O}$	Sodium rubidium chromic oxalate.....	M.	Bi.	—		56°	Ax. pl. b(010); $X \perp c(001)$	(G)
$\text{Rb}_2\text{Na}_3\text{Al}_3\text{C}_4\text{O}_{16} \cdot 23\text{H}_2\text{O}$	Sodium rubidium aluminium oxalate.....	M.	Bi.	—		24° 30'	Ax. pl. b(010); $X \perp (001)$	(G)

C-TABLE

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
21	CHI_3	Iodoform.....	H.	Un.	—				(G)
55	CH_3ON_3	Urea.....	Tet.	Un.	—				(G)
58	$\text{CH}_4\text{N}_2\text{S}$	Thiourea.....	R.	Bi.	—		69° 54'–70° 59'	Ax. pl. a(001); $X \parallel b$	(G)
64.1	$\text{CH}_3\text{O}_3\text{As}$	Methyl arsenate.....	M.	Bi.	—	14° 24'		Ax. pl. $\perp b(010)$; $X \wedge c = 53^\circ 20'$ in acute $\angle \beta$	(G)
70	$\text{CH}_3\text{O}_3\text{N}_3$	Urea nitrate.....	M.	Bi.	—		23° 10'	Ax. pl. b(010); $X \perp c(001)$	(G)
	$\text{CH}_3\text{O}_3\text{N}_3\text{S}$	Ammonium methanedisulfonate.....	M.	Bi.	—	79° 34'		Ax. pl. $\perp b(010)$; $X \wedge c = 39^\circ$ in obtuse $\angle \beta$	(G)
84.1	$\text{C}_2\text{Cl}_4\text{Br}_2$	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane	R.	Bi.	—		87° 45'	Ax. pl. a(100); $X \parallel c$	(G)
87	C_2Br_4	Hexabromoethane.....	R.	Bi.	—		79° 30'	Ax. pl. a(100); $X \parallel c$	(G)
92	C_2Cl_6	Hexachloroethane.....	R.	Bi.	—		66° 28'	Ax. pl. a(100)	(G)
	$\text{C}_2\text{O}_3\text{N}_2\text{I}_2$	Diiodofuroxane.....	R.	Bi.	—	63° 38'		Ax. pl. c(001); $Z \parallel a$	(G)
147	$\text{C}_2\text{H}_2\text{O}_4$	Oxalic acid.....	R.	Bi.	+			Ax. pl. c(001); $Z \parallel b$	(G)
	$\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$	Oxalic acid.....	M.	Bi.	—	68°		Ax. pl. $\perp b(010)$; $X \parallel b$	(G)
161	$\text{C}_2\text{H}_3\text{O}_2\text{Cl}_3$	Chloral hydrate.....	M.	Bi.	—	20° 48'	35° (apprx.)	Ax. pl. b(010); $X \wedge c = 58^\circ 45'$ in obtuse $\angle \beta$	(G)
238	$\text{C}_2\text{H}_5\text{ON}$	Acetamide (Unst. mod.).....	?	Bi.	—		120° (apprx.)		(27)
238	$\text{C}_2\text{H}_5\text{ON}$	Acetamide (St. mod.).....	Trig.	Un.	—				(G)
248	$\text{C}_2\text{H}_4\text{O}_4\text{N}_2 \cdot \text{H}_2\text{O}$	Ammonium hydrogen oxalate.....	R.	Bi.	—		22° 32'	Ax. pl. a(100); $X \parallel c$	(G)
	$\text{C}_2\text{H}_4\text{O}_4\text{NCl}$	Glycocoll hydrochloride.....	R.	Bi.	—		63° 50'	Ax. pl. a(100); $X \parallel b$	(G)
303	$\text{C}_2\text{O}_3\text{H}_2\text{N}_2 \cdot \text{H}_2\text{O}$	Ammonium oxalate.....	R.	Bi.	—	61° 44'	110° 8'	Ax. pl. a(100); $X \parallel c$	(G)
306	$\text{C}_2\text{H}_{10}\text{N}_2\text{Cl}_2$	Ethylenediamine hydrochloride.....	M.	Bi.	—	81° 4'		Ax. pl. b(010); $X \wedge c = 6^\circ$ in acute $\angle \beta$	(G)
308.1	$\text{C}_3\text{N}_3\text{Cl}_3$	Cyanuric trichloride.....	M.	Bi.	—		28°	Ax. pl. $\perp b(010)$	(G)
313.1	$\text{C}_3\text{H}_7\text{ON}_3\text{Br}_2$	Dibromocyanacetamide.....	M.	Bi.	+		29° 52'	Ax. pl. $\perp b(010)$; $Z \wedge c = 34^\circ$ in obtuse $\angle \beta$	(G)
	$\text{C}_3\text{H}_5\text{N}_2\text{Cl}$	4-Chloropyrazole.....	R.	Bi.	+		100° (apprx.)	Ax. pl. a(100)	(G)
	$\text{C}_3\text{H}_4\text{O}_3\text{Br}_2 \cdot \text{H}_2\text{O}$	Dibromopyrrolacemic acid.....	M.	Bi.	+		34° 9'	Ax. pl. $\perp b(010)$	(G)
	$\text{C}_3\text{H}_4\text{ON}_2\text{S}$	Pseudothiohydantoin.....	R.	Bi.	—		81° 30'	Ax. pl. a(100); $X \parallel b$	(G)
	$\text{C}_3\text{H}_4\text{O}_2\text{N}_2\text{S}$	Pyrazol-4-sulfonic acid.....	Tet.	Un.	—				(L-B)
436	$\text{C}_3\text{H}_4\text{O}_2\text{N}_2$	Malonamide (metast. mod.).....	Tet.	Un.	—				(G)
444	$\text{C}_3\text{H}_4\text{O}_2\text{N}_4$	Ammonium fulminurate.....	M.	Bi.	—				(G)
	$\text{C}_3\text{H}_7\text{O}_2\text{N}$	β -Alanine.....	R.	Bi.	—		70° (apprx.)	Ax. pl. c(001); $X \parallel b$	(G)
	$\text{C}_3\text{H}_{10}\text{NBr}$	Trimethyl ammonium bromide.....	M.	Bi.	+		50° (apprx.)	Ax. pl. (010)	(G)
	$\text{C}_3\text{H}_{10}\text{NI}$	Trimethyl ammonium iodide.....	M.	Bi.	+		53° (apprx.)	Ax. pl. (010)	(G)
535	$\text{C}_3\text{H}_{11}\text{O}_3\text{N}_4$	Guanidine carbonate.....	Tet.	Un.	—				(G)
	$\text{C}_3\text{H}_3\text{O}_2\text{NBr}_2$	Dibromosuccinimide.....	M.	Bi.	+		20° 50'	Ax. pl. b(010); $Z \wedge c = 8^\circ$ in obtuse $\angle \beta$	(G)
679.1	$\text{C}_3\text{H}_2\text{O}_4\text{N}_2 \cdot 2\text{H}_2\text{O}$	Nitrotetronic acid.....	M.	Bi.	—			Ax. pl. b(010)	(G)
	$\text{C}_3\text{H}_4\text{O}_2\text{Br}_2$	<i>trans</i> - α - β -Dibromocrotonic acid.....	M.	Bi.	—		56° 1'	Ax. pl. $\perp b(010)$	(G)
	$\text{C}_3\text{H}_4\text{O}_2\text{N}_2$	Mesotartaric acid nitrile.....	M.	Bi.	+		50° (apprx.)		(G)
	$\text{C}_3\text{H}_4\text{O}_2\text{Cl}$	α -Chlorocrotonic acid.....	M.	Bi.	+		68° 17'	Ax. pl. $\perp b(010)$; $Z \wedge c = 35^\circ$ in obtuse $\angle \beta$	(G)
592	$\text{C}_3\text{H}_4\text{O}_2\text{N}(\text{St. mod.})$	Succinimide.....	R.	Bi.	—		99°	Ax. pl. (010); $\text{Bx}_a \perp (010)$	(28)
602	$\text{C}_4\text{H}_6\text{Br}_4$	Butadiene tetrabromide.....	R.	Bi.	+		57° (apprx.)	Ax. pl. a(100); $Z \parallel c$	(G)
	$\text{C}_4\text{H}_9\text{O}_2\text{NCl}_2$	Ammonium trichloroisobutyrate.....	R.	Bi.	+		96°	Ax. pl. c(001)	(G)
	$\text{C}_4\text{H}_8\text{O}_2\text{N}_2\text{S}$	3-Methylpyrazole-4-sulfonic acid.....	M.	Bi.	—	53°	92°	Ax. pl. $\perp b(010)$; $Z \parallel b$	(G)
610	$\text{C}_4\text{H}_4\text{O}_2\text{N}_4$	Allantoin.....	H.	Un.	—				(21)
	$\text{C}_4\text{H}_4\text{O}_4\text{Se}$	Selenodiglycolic acid.....	M.	Bi.	—	78° 30'		Ax. pl. b(010); $Z \wedge c = 41^\circ$ in obtuse $\angle \beta$	(G)
640	$\text{C}_4\text{H}_4\text{O}_4 \cdot \text{H}_2\text{O}$	<i>dl</i> -Tartaric acid.....	Tri.	Bi.	—	67° 10'		Ax. pl. $\parallel p(110)$	(G)
	$\text{C}_4\text{H}_7\text{O}_4\text{N}$	<i>dl</i> -Aspartic acid.....	M.	Bi.	—	81° 44'		Ax. pl. $\perp b(010)$	(G)
	$\text{C}_4\text{H}_7\text{O}_2\text{N}$	Acetamide oxalate.....	R.	Bi.	—		25°	Ax. pl. a(100); $X \parallel c$	(G)
697.1	$\text{C}_4\text{H}_5\text{O}_2\text{Cl}_2$	Dichlorobutylene glycol.....	Trig.	Un.	—				(G)
	$\text{C}_4\text{H}_5\text{O}_7\text{N}_8\text{b} \cdot \text{H}_2\text{O}$	Ammonium antimonil tartrate.....	R.	Bi.	—		130° 46'	Ax. pl. c(001); $X \parallel b$	(G)
708	$\text{C}_4\text{H}_5\text{O}_2\text{N}_2 \cdot \text{H}_2\text{O}$	Asparagine.....	R.	Bi.	+	1. 86° 40' d. 87° 16'		Ax. pl. b(010); $Z \parallel c$	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
709	C ₄ H ₈ O ₄ N ₂	Tartramide.....	R.	Bi.	—		43° (apprx.)	Ax. pl. b(010); X||a	(G)
	C ₄ H ₇ O ₄ N	Ethylamine dioxalate.....	M.	Bi.	—		89° 20'	Ax. pl. b(010)	(G)
776	C ₄ H ₈ O ₄ N	Ammonium hydrogen malate.....	R.	Bi.	—	47° 54'	75° 24'	Ax. pl. b(010); X||c	(G)
778	C ₄ H ₇ O ₄ N	Ammonium hydrogen tartrate.....	R.	Bi.	—	79° 54'		Ax. pl. c(001); X||b	(G)
786	C ₄ H ₇ N ₃ O ₃	Guanidine lactate.....	R.	Bi.	+	79° 12'		Ax. pl. a(100); Z||b	(G)
788	C ₄ H ₁₀ N ₄ S ₂	Ethylenediamine thiocyanate.....	M.	Bi.	—	51°	89° 20'	Ax. pl. b(010); X∧c = 64° 30' in obtuse ∠β	(G)
808	C ₄ H ₁₀ O ₄	i-Erythrite.....	Tet.	Un.					(G)
	C ₄ H ₁₂ NI	Diethyl ammonium iodide.....	R.	Bi.	+		52° 15' (apprx.)	Ax. pl. (001); Z||a	(G)
	C ₄ H ₁₂ O ₄ N ₂	Ammonium malate.....	R.	Bi.		47° 34' (red)			(L-B)
835	C ₄ H ₁₂ O ₄ N ₂	Ammonium tartrate.....	M.	Bi.	—	39° 36'	64° 46'	Ax. pl. b(010); X∧c = 18° 41' in obtuse ∠β	(G)
835.1	C ₄ H ₁₂ O ₄ N ₂	Ammonium racemate.....	M.	Bi.	+	60° 54'		Ax. pl. b(010)	(G)
	C ₄ H ₇ O ₄ Cl	Chlorocitraconic acid.....	R.	Bi.	+	46° 24' (blue)	75° 5' (blue)	Ax. pl. b(010); Z||c	(G)
	C ₆ H ₄ O ₄ N ₂ ·H ₂ O	Pyrasole dicarboxylic acid.....	M.	Bi.		77°		Ax. pl. ⊥b(010); Z appr. ⊥s(403)	(G)
868	C ₆ H ₈ O ₄	Aconic acid.....	R.	Bi.	—			Ax. pl. a(100); X||b	(G)
877	C ₆ H ₈ O ₄ N	Pyrrrole-2-carboxylic acid.....	M.	Bi.	+	62° 7'		Ax. pl. b(010); Z∧c = 23° 45' in obtuse ∠β	(G)
	C ₆ H ₇ O ₄ N ₂	Urimidosuccinic acid.....	R.	Bi.	+	78° 14'		Ax. pl. a(100); Z||c	(G)
900	C ₆ H ₈ O ₄	Itaconic acid.....	R.	Bi.	+		97° 40' (red)	Ax. pl. b(010); Z||a	(G)
	C ₆ H ₇ O ₄ Br	Citrabromopyrotartaric acid.....	M.	Bi.		76°		Ax. pl. ⊥b(010); Z∧c = 62° in acute ∠β	(G)
	C ₆ H ₇ O ₄ N ₂	Urimidosuccinic acid amide.....	M.	Bi.		79° 35'		Ax. pl. b(010)	(G)
947.1	C ₆ H ₈ O ₄	Methyltetronic acid lactone.....	R.	Bi.	+		120° 10'		(14)
957	C ₆ H ₈ O ₄ ·H ₂ O	Methyl hydrogen d-tartrate.....	R.	Bi.		60° (apprx.)		Ax. pl. a(100); Z||c	(G)
	C ₆ H ₇ O ₄ Br	Bromohydroxyglutic acid.....	M.	Bi.			150°		(G)
	C ₆ H ₈ O ₄ N	Hydroxypiperidone.....	M.	Bi.	+		92° 33'	Ax. pl. ⊥b(010); Z nearly ⊥a(100)	(G)
975.1	C ₆ H ₇ O ₄ N	α-Acetylaminopropionic acid.....	R.	Bi.	—	36° 9'		Ax. pl. a(100); X||c	(G)
977	C ₆ H ₇ O ₄ N	d(l)-Glutaminic acid.....	R.	Bi.	—	40° 27'	66° 35'	Ax. pl. b(010); X||a	(G)
988.1	C ₆ H ₁₀ O ₄ NCl	d(l)-Glutamic acid hydrochloride.....	R.	Bi.	+	70° 44'		Ax. pl. a(100); Z||b	(G)
994.1	C ₆ H ₁₀ O ₄ N ₂	Dimethylmalonamide.....	R.	Bi.	+		58° 27'	Ax. pl. b(010); Z||c	(G)
996	C ₆ H ₁₀ O ₄ N ₂	Amylene nitrosate.....	M.	Bi.	+	62° 65'	103° 53'	Ax. pl. ⊥b(010); Z∧c = 7° in obtuse ∠β	(G)
1035	C ₆ H ₁₀ O ₄	d-Lyxose.....	M.	Bi.	—			Ax. pl. b(010)	(G)
1070.2	C ₆ H ₁₁ O ₄ N	Methyltetronamide.....	Not det.	Bi.	+		Large 35°		(14)
	C ₆ H ₁₁ NBr	Piperidine hydrobromide.....	R.	Bi.			52° 56' (apprx.)	Ax. pl. b(010); Z||a	(G)
1075	C ₆ H ₁₁ NCl	Piperidine hydrochloride.....	R.	Bi.	—			Ax. pl. c(001); X||a	(G)
1093	C ₆ H ₁₁ O ₄	Pentaerythritol.....	Ditet.	Un.					(G)
	C ₆ H ₁₁ NBr ₂	Trimethyl-bromoethylammonium bromide.....	M.	Bi.	+		40° 2'	Ax. pl. ⊥(010); Z∧c = 30° 30' in acute ∠β	(G)
	C ₆ O ₂ N ₂ Br ₄	1, 2, 3, 5-Tetrabromodinitrobenzene.....	M.	Bi.	—		45° 54'	Ax. pl. b(010); X⊥r(201)	(G)
	C ₆ OCl ₂	β-Octochlorocyclohexenone.....	R.	Bi.	+			Ax. pl. b(010); Z||a	(G)
	C ₆ OCl ₂	γ-Octochlorocyclohexenone.....	M.	Bi.	—	37° 38'	65° 50'	Ax. pl. b(010); X∧c = about 93° in obtuse ∠β	(G)
1120	C ₆ HCl ₅ O	Pentachlorophenol (β-mod.).....	M.	Bi.	+		65° 23.5'	Ax. pl. ⊥b(010); Z∧c = 3° in acute ∠β	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 3-Dinitro-4, 6-dibromobenzene (St. mod.).....	R.	Bi.	+		56° 52'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 3-Dinitro-4, 6-dibromobenzene (metast. mod.).....	R.	Bi.	—		73° 5'	Ax. pl. ⊥b(010); X⊥a(100)	(G)
	C ₆ H ₃ O ₄ N ₂ Br ₂	1, 2-Dinitro-4, 5-dibromobenzene.....	R.	Bi.	—	2H =	88° 22'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₃ O ₄ NBr ₂	2, 4, 6-Tribromonitrobenzene.....	M.	Bi.	—		90° 13'	Ax. pl. ⊥b(010)	(G)
1142	C ₆ H ₃ O ₄ N ₂ I ₂	1, 3-Dinitro-2, 4-diiodo-benzene.....	R.	Bi.	+	63° 26'		Ax. pl. a(100); Z||c	(G)
1149	C ₆ H ₃ O ₄ N ₂ Br	3-Bromo-1, 2-dinitrobenzene.....	R.	Bi.	+	51° 30' (red)		Ax. pl. b(010); Z||c	(G)
1155	C ₆ H ₃ O ₄ NBr ₂	3, 5-Dibromonitrobenzene.....	M.	Bi.	—		72° 19'	X∧c = 29° in obtuse ∠β	(G)
1155.1	C ₆ H ₃ O ₄ NBr ₂	Nitrodibromophenol.....	M.	Bi.			70°-73°	Ax. pl. ⊥b(010)	(G)
1163	C ₆ H ₃ O ₄ N ₂ Cl	4-Chloro-1, 2-dinitrobenzene.....	M.		—		45° 31'	Ax. pl. ⊥b(010)	(G)
1165	C ₆ H ₃ O ₄ N ₂ Cl	α-4-Chloro-1, 3-dinitrobenzene (St. mod.).....	R.	Bi.			102° 46' (red)	Ax. pl. b(010); Z||c	(G)
1165	C ₆ H ₃ O ₄ N ₂ Cl	α-4-Chloro-1, 3-dinitrobenzene (metast. mod.).....	R.	Bi.	+		94° 15'	Ax. pl. a(100); Z||b	(G)
1174.1	C ₆ H ₃ O ₄ NCl ₂	4, 6-Dichloro-2-nitrophenol.....	M.	Bi.	—		62° 29'		(G)
	C ₆ H ₃ O ₄ NI ₂	2, 6-Diiodo-4-nitrophenol.....	Tri.	Bi.			55° 30'		(G)
1200	C ₆ H ₃ O ₄ N ₄	Tetranitroaniline.....	M. or Tri.	Bi.	—		120° (at least)		(37)
1216	C ₆ H ₃ O ₄ NCl	m-Chloronitrobenzene.....	R.	Bi.	—		91° 23'	Ax. pl. a(100); X||a	(G)
	C ₆ H ₄ O ₄ NSCl	p-Nitrobenzenesulfonyl chloride.....	M.	Bi.	—		65° (apprx.)	Ax. pl. b(010); X∧c = 33° 36' in obtuse ∠β	(G)
1243	C ₆ H ₃ O ₄ S ₂ Cl ₂	m-Benzenedisulfonyl chloride.....	M.	Bi.	—		80° 35'	Ax. pl. b(010); X∧c = 85° in obtuse ∠β	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
1274	C ₆ H ₄ O ₂ N ₂	2, 3-Dinitrophenol.....	M.	Bi.			16°	Ax. pl. \perp (010)	(29)
1277	C ₆ H ₄ O ₂ N ₂	2, 6-Dinitrophenol.....	R.	Bi.	+		95° 40'	Ax. pl. b(010); Z||a	(G)
1278	C ₆ H ₄ O ₂ N ₂	3, 4-Dinitrophenol.....	Tri.	Bi.			65°		(29)
1377	C ₆ H ₅ NBr	p-Bromoaniline.....	R.	Bi.	+		26° 57.5'	Ax. pl. c(001); Z||a	(G)
	C ₆ H ₄ O ₂ NCl	Nicotinic acid hydrochloride.....	R.	Bi.	-		96° 22'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₄ O ₂ NCl	Picolinic acid hydrochloride.....	R.	Bi.	-	41° 16'	73° 52'	Ax. pl. b(010); X||c	(G)
1384	C ₆ H ₆ Cl ₆	α -trans-Benzenehexachloride.....	M.	Bi.	+		62° 2'	Ax. pl. b(010); Z \wedge c = 42° 25' in obtuse $\angle\beta$	(G)
	C ₆ H ₅ ON ₂	Picolinamide.....	M.	Bi.	+		73° 20' (red)	Ax. pl. b(010)	(G)
	C ₆ H ₄ O ₂ N ₂	2-Methylpyrazine-5-carboxylic acid.....	R.	Bi.			35° (apprx.)	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₄ O ₂ N ₂ S	p-Nitrobenzenesulfamide.....	M.	Bi.		59°		Ax. pl. b(010); Z \wedge c = 70° in acute $\angle\beta$	(G)
1412	C ₆ H ₅ O ₇ N ₄	Ammonium picrate.....	R.	Bi.	-		56°		(27)
1414	C ₆ H ₄ O ₂	o-Dihydroxybenzene.....	M.	Bi.	+		58° (apprx.)	Ax. pl. \perp b(010); Z \wedge c = 6°-7°	(G)
1415	C ₆ H ₄ O ₂	Resorcinol.....	R.	Bi.	-	46° 14'	76° 6'	Ax. pl. c(001); X||a	(G)
1416	C ₆ H ₄ O ₂	Hydroquinonol.....	Trig.	Un.					(G)
	C ₆ H ₄ O ₂	Phloroglucinol.....	R.	Bi.	-		63° 49'	Ax. pl. c(001); X||a	(G)
	C ₆ H ₄ O ₂	α -Methyl- β -hydroxy- γ -pyrone (β -mod.).....	R.	Bi.			8small	Ax. pl. (001); Bx ₀ = b-axis	(26)
1448	C ₆ H ₇ ON	p-Aminophenol.....	R.	Bi.	-		47° 37'	Ax. pl. c(001); X||a	(G)
	C ₆ H ₄ O ₂ NS	Phenylsulfhydroxamic acid.....	R.	Bi.	+		43° 29'	Ax. pl. c(001); Z||a	(G)
	C ₆ H ₅ NBr	Aniline hydrobromide.....	R.	Bi.	-		35°	Ax. pl. a(100)	(G)
	C ₆ H ₄ O ₂ Br ₄	Tetrabromocaproic acid.....	M.	Bi.	+		21° 52'	Ax. pl. \perp b(010); Z \wedge c = 100° in obtuse $\angle\beta$	(G)
	C ₆ H ₄ O ₂ N ₂ Cl ₂	1, 4-Dichloro-1, 4-dinitroscyclohexane.....	M.	Bi.	+	61° 58' (blue)	100° 15' (white)	Ax. pl. b(010); Z \wedge c = 40° 30' in acute $\angle\beta$	(G)
	C ₆ H ₄ O ₂ NCl ₂ .2H ₂ O	Ammonium trichlorodihydroxycyclopentane carboxylate.....	R.	Bi.			81° (apprx.)	Ax. pl. b(100)	(4)
	C ₆ H ₅ N ₂	2, 6-Dimethylpyrazine.....	M.	Bi.			86° (apprx.)	Ax. pl. b(010); Z \wedge c = 20° in obtuse $\angle\beta$	(G)
1507	C ₆ H ₅ O ₇ .H ₂ O	Citric acid.....	R.	Bi.	+	65° 42'	108° 40'	Ax. pl. a(100); Z||a	(G)
1523	C ₆ H ₄ O ₂ NS	Ammonium benzenesulfonate.....	R.	Bi.	+		33° 36'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₅ O ₂ N	Trimorpholine.....	M.	Bi.	+	80°		Ax. pl. b(010)	(G)
	C ₆ H ₄ O ₂ N	Acetamide dioxalate.....	Tri.	Bi.	-		69° 20'		(G)
	C ₆ H ₁₀ O ₄ Br ₂	Inosite dibromhydrin.....	R.	Bi.	+	67° 30'		Ax. pl. b(010); Z||a	(G)
	C ₆ H ₁₀ ClNO ₂	Trimorpholine hydrochloride.....	M.	Bi.			50° 60'	Ax. pl. \perp b(010) (red)	(G)
1562	C ₆ H ₁₀ O ₄	Adipic acid.....	M.	Bi.	-		47° 30'	Ax. pl. b(010)	(G)
1563	C ₆ H ₁₀ O ₄	1, 1-Dimethylsuccinic acid.....	M.	Bi.		16° 12'	41° 28'	Bx ₀ nearly \perp (001); Ax. pl. (010)	(28)
	C ₆ H ₁₀ O ₄	1-Glycosan (1-Glucose anhydride).....	R.	Bi.	-		71° 45'	Ax. pl. a(100); X||c	(G)
	C ₆ H ₁₀ O ₄	dl-Dilactylic acid.....	R.	Bi.	-		65°	Ax. pl. ||(010); Bx ₀ \perp (001)	(17)
	C ₆ H ₁₀ O ₄	Dilactylic acid.....	R.	Bi.	-		65° (apprx.)	Ax. pl. b(010); X||c	(G)
	C ₆ H ₁₀ O ₄	Isosaccharine.....	M.	Bi.	+		25° 19'	Ax. pl. \perp b(010); Z \wedge c = 63° 15' in obtuse $\angle\beta$	(G)
	C ₆ H ₁₁ O ₇ N	Acetamide ditartrate.....	M.	Bi.	-		70° 30'	Ax. pl. b(010); X \wedge c = 36° in acute $\angle\beta$	(G)
	C ₆ H ₁₁ O ₂ N ₂	Pyrrolidine- α , α -dicarboxylic acid diamide.....	R.	Bi.	+		63° 30' (apprx.)	Ax. pl. b(010); Z||c	(G)
	C ₆ H ₁₁ O ₂ N ₂ S ₂ .H ₂ O	Ammonium phenol-2, 4(?)-disulfonate.....	M.	Bi.	+		113° 45'	Ax. pl. b(010); Z \wedge c = 25° 21' in obtuse $\angle\beta$	(G)
	C ₆ H ₁₁ O ₂	cis- α -Dihydroxyhexahydrobenzene.....	R.	Bi.	+		53° 10'	Ax. pl. b(010); Z||c	(G)
	C ₆ H ₁₁ O ₂	α -Methylxyloside.....	M.	Bi.	-	35° 14'	54° 55'	Ax. pl. b(010); X \wedge c = 30° in acute $\angle\beta$	(G)
1670	C ₆ H ₁₁ O ₂	d-Quercitol.....	M.	Bi.	+		58° 1'	Ax. pl. b(010); Z \wedge c = 11° 46' in acute $\angle\beta$	(G)
1672	C ₆ H ₁₂ O ₅ .H ₂ O	β -Rhamnose.....	M.	Bi.	-	58° 5'		Ax. pl. b(010)	(G)
	C ₆ H ₁₂ O ₅ .2H ₂ O	d(l)-Inosite.....	R.	Bi.	+		42° 30'	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₁₂ O ₅ .2H ₂ O	Dambose ("meso"-inosite).....	M.	Bi.	+		47° 20'	Ax. pl. \perp b(010); Z \wedge c = 17° in obtuse $\angle\beta$	(G)
	C ₆ H ₁₂ O ₅ N.H ₂ O	Ammonium hydrogen ethoxysuccinate.....	R.	Bi.			20° (apprx.)	Ax. pl. c(001); Z||b	(G)
	C ₆ H ₁₂ ON ₂	2-Propylantipyrine.....	M.	Bi.		52° 50'			(L-B)
	C ₆ H ₁₂ O ₅ S ₂ N ₂ Cl ₂	Cystine hydrochloride.....	M.	Bi.	+		3° 16'	Ax. pl. \perp b(010); Z \perp a(101)	(G)
1750	C ₆ H ₁₂ O ₄	Dulcitol.....	M.	Bi.	-		151° 10' (red)	Ax. pl. \perp b(010); X||b	(G)
1751	C ₆ H ₁₄ O ₄	d-Mannitol (α -mod.).....	R.	Bi.	-		100° (apprx.)	Ax. pl. c(001); X||b	(G)
1751	C ₆ H ₁₄ O ₄	d-Mannitol (β -mod.).....	R.	Bi.	-		71° 30'	Ax. pl. a(100); X||b	(G)
1752.1	C ₆ H ₁₄ O ₄ . $\frac{1}{2}$ H ₂ O	Sorbitol.....	M.	Bi.	-		100° (apprx.)	Ax. pl. b(010); Z nearly \perp c(001)	(G)
1769.1	C ₆ H ₁₃ PS	Triethylphosphine sulfide.....	H.	Un.	+				(G)
	C ₆ H ₁₂ N ₂ Br ₂ .H ₂ O	β -2, 5-Dimethylpiperazine hydrobromide.....	R.	Bi.	+		72° (apprx.)	Ax. pl. a(100); Z||c	(G)
	C ₆ H ₁₂ NI	Dimethyl diethyl ammonium iodide.....	R.	Bi.			82°	Z||c	(G)
	C ₇ H ₂ O ₂ Cl ₆	1-Methyl-1, 3, 3, 5, 5-pentachlorocyclohexan-2, 4, 6-trione.....	R.	Bi.	+		15° (apprx.)	Ax. pl. a(100); Z c	(G)

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1789	$C_7H_5O_4N_3$	2, 4, 6-Trinitrobenzoic acid.....	R.	Bi.	+		84° 36'	Ax. pl. c(001); Z b	(G)
	$C_7H_5O_4Cl_2$	3, 5-Dichlorosalicylic acid.....	R.	Bi.	+		29° 15'	Ax. pl. b(010); Z c	(G)
1835	$C_7H_5O_4N_3$	2, 4-Dinitrobenzoic acid.....	M.	Bi.	-		18°	Ax. pl. (010); Bxa nearly \perp (101)	(11)
1837	$C_7H_5O_4N_3$	2, 6-Dinitrobenzoic acid.....	R.	Bi.	+		103°	Ax. pl. (100); Bxa \perp (010)	(11)
1839	$C_7H_5O_4N_3$	3, 5-Dinitrobenzoic acid.....	M.	Bi.	-		80° 16'	Ax. pl. b(010); X \wedge c = 48° in acute $\angle\beta$	(G)
	$C_7H_5O_4$	Chelidonic acid.....	M.	Bi.	-		40° (apprx.)	Ax. pl. \perp b(010); X nearly ||r(101)	(G)
1843	$C_7H_5O_7 \cdot 3H_2O$	Meconic acid.....	R.	Bi.	-		48° 55'	Ax. pl. b(010); X||c	(G)
1881	$C_7H_5O_4I$	<i>o</i> -Iodobenzoic acid.....	M.	Bi.			70° (apprx.)	Ax. pl. \perp b(010); Bxa ||c-axis	(G)
1903	$C_7H_5O_4N \cdot 2H_2O$	Dipicolinic acid.....	R.	Bi.	-		99°	Ax. pl. (001); Bx \perp (010)	(22)
1909	$C_7H_5O_4N$	5-Nitro-2-hydroxybenzoic acid.....	M.	Bi.	+		105° 38'		(G)
1977	$C_7H_5N_3$	Benzimidazol.....	R.	Bi.	+	86° 45'		Ax. pl. c(001); Z||b	(G)
1979	$C_7H_5N_3$	Indazole.....	M.	Bi.		50° (apprx.)		Ax. pl. b(010); Z \wedge c = 18° in obtuse $\angle\beta$	(G)
1985	$C_7H_5O_4N_2$	2, 4-Dinitrotoluene.....	M.	Bi.	-			Ax. pl. \perp b(010); X \wedge c = 32° in acute $\angle\beta$	(G)
1987	$C_7H_5O_4N_2$	2, 6-Dinitrotoluene.....	R.	Bi.	-			Ax. pl. a(100); X||c	(G)
1989	$C_7H_5O_4N_2$	3, 5-Dinitrotoluene.....	M.	Bi.	-		98° 4'	Ax. pl. \perp b(010)	(G)
	$C_7H_5ON_4 \cdot H_2O$	<i>o</i> -Phenylhydroxytetrazole.....	R.	Bi.		60°-70°		Ax. pl. a(100); Z||c	(G)
2074	$C_7H_5O_4N$	Anthranilic acid.....	R.	Bi.			78° 30' (Hg, yellow)	Ax. pl. c(001); Z||a; Bxa \perp (100)	(G)
	$C_7H_7O_3N$	Benzohydroxamic acid.....	R.	Bi.	+		50° 2'	Ax. pl. a(100); Z||b	(G)
	$C_7H_7O_3N \cdot H_2O$	Pyridinebetaine.....	M.	Bi.	-	25° 18'		Ax. pl. b(010); X \wedge c = 12° 45' in obtuse $\angle\beta$	(G)
	$C_7H_7O_4N_2$	3, 5-Dinitro- <i>p</i> -toluidine.....	R.	Bi.			100° (apprx.)	Ax. pl. a(100); Z||b	(2)
	C_7H_7ONCl	Isobenzaldoxime hydrochloride.....	R.	Bi.					(G)
	$C_7H_7O_3NCl$	Pyridinebetaine hydrochloride.....	M.	Bi.	+	52° 3'	88° 8'	Ax. pl. \perp b(010); Z \wedge c = 9° 27' in acute $\angle\beta$	(G)
2174	$C_7H_7O_3N_2 \cdot H_2O$	Benzenylamidinium nitrite.....	M. (?)	Bi.	-		78° 55'	Ax. pl. ||d(010)	(G)
2185	$C_7H_5O_4$	Guaiacol.....	Trig.	Un.					(G)
	$C_7H_5O_4$	Hydrochelidonic anhydride.....	R.	Bi.	-		120° (apprx.)	Ax. pl. c(001); X||a	(G)
	$C_7H_5O_4Br$	Bromo-shikimilactone.....	H.	Un.					(G)
	$C_7H_5N_2Cl_2 \cdot 2H_2O$	Benzenylamidinium hydrochloride.....	R.	Bi.			35° (apprx.)	Ax. pl. a(100); Z||c	(G)
	$C_7H_5O_3Cl_2 \cdot 2H_2O$	α , α -Dimethyl- γ -pyrone hydrochloride.....	R.	Bi.	-		90° (apprx.)	Ax. pl. a(100); X||b	(G)
	C_7H_5ON	3-Amino- <i>p</i> -cresol.....	R.	Bi.	+		44° 46'	Ax. pl. a(100); Z||c	(G)
	$C_7H_5ON \cdot 3H_2O$	2, 6-Dimethyl-4-hydroxypyridine.....	M.	Bi.			110° 41'	Ax. pl. b(010)	(G)
2225	$C_7H_5O_4N$	Ammonium benzoate.....	R.	Bi.	+		67°	Ax. pl. a(100); Z||c	(G)
2233	$C_7H_5O_4NS$	<i>p</i> -Toluidine-2-sulfonic acid.....	M.	Bi.	+		87° 54'	Ax. pl. b(010); Z \wedge c = 8° in obtuse $\angle\beta$	(G)
2234.1	$C_7H_5O_4NS$	Ammonium <i>o</i> -sulfobenzoate.....	R.	Bi.	-	53° 29'	84° 39'	Ax. pl. b(010); X||a	(G)
	C_7H_5NBr	Toluidine hydrobromide.....	R.	Bi.	-	82° 37'		Ax. pl. c(001); X||b	(G)
	$C_7H_5O_4Br_2$	Dibromotrihydroxy tetrahydrobenzoic acid.....	R.	Bi.	+	76° 32'		Ax. pl. c(001)	(G)
2260.1	$C_7H_5O_7N_2$	Mono-uridihydroxy dimethyl succinate.....	R.	Bi.		72° 15.5'		Ax. pl. b(010); Z||c	(G)
2260.2	$C_7H_5O_4N_4$	Isohydroxydimethylurea.....	M.	Bi.	+	40° 9.5'	62° 34.25'	Ax. pl. \perp b(010); Z \wedge c = 2° 15' in acute $\angle\beta$	(G)
	$C_7H_{11}O_4N_2S \cdot 2H_2O$	2, 4-Toluyldiamine sulfate.....	M.	Bi.			100° (apprx.)		(G)
	$C_7H_{11}O_4$	Trimethyl succinic acid.....	R.	Bi.		84° 11'		Ax. pl. (100); Bxa \perp (001)	(22)
	$C_7H_{11}O_5$	<i>l</i> -Methylrhamnose.....	R.	Bi.	-	36° 11'	57° 8'	Ax. pl. b(010); X||c	(G)
	$C_7H_{11}O_5$	α -Methyl mannoside.....	R.	Bi.	+	46° 58'	75°	Ax. pl. b(010); Z||a	(G)
2372	$C_7H_{11}O_5$	α -Methyl glucoside.....	R.	Bi.	+	85° 18'		Ax. pl. b(010); Z||c	(G)
2373	$C_7H_{11}O_5$	β -Methyl glucoside.....	Tet.	Un.					(G)
	$C_7H_{11}O_5 \cdot H_2O$	<i>dl</i> - α -Methyl galactoside.....	R.	Bi.	+	53° 5'	85° 45'	Ax. pl. a(100); Z||c	(G)
	$C_8H_5O_4N_2Cl_2$	2, 4, 6-Trichloro-3-nitrobenzoic acid methyl nitramide.....	M.	Bi.	-		42° (apprx.)	Ax. pl. \perp b(010); X \wedge c = 69° in acute $\angle\beta$	(G)
	$C_8H_5O_4N$	Isatoic acid anhydride.....	M.	Bi.			90° (apprx.)	Ax. pl. \perp b(010)	(G)
	$C_8H_5O_4N$	Phthaloxime.....	M.	Bi.					(22)
2452	C_8H_5NBr	Bromobenzyl cyanide.....	Trig.	Un.					(L-B)
	$C_8H_5O_4N_2Br$	1-Nitro-3-bromo-4-acetanilide (St. mod.).....	M.	Bi.	-		124° 10'	Ax. pl. \perp b(010)	(G)
	$C_8H_5O_4Cl_4$	Tetrachlorophloroglucinol dimethyl ether.....	R.	Bi.	+		90° (apprx.)	Ax. pl. a(100)	(G)
	$C_8H_7O_4N_2Br$	Nitrobromoacetanilide (α -mod.).....	M.	Bi.	-		124° 10'	Ax. pl. \perp (010); Bxa nearly \perp (001)	(2)
	$C_8H_7ONCl_2$	Dichloroacetanilide.....	M.	Bi.	+	83° 35'		Ax. pl. \perp b(010); Z \wedge c = 61° in obtuse $\angle\beta$	(G)
2536	$C_8H_7O_4N_3$	2, 3, 6-Trinitro- <i>p</i> -xylene.....	M.	Bi.	-	64° 32'		Ax. pl. b(010); X \wedge c = 28° in obtuse $\angle\beta$	(G)

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2556	C ₈ H ₅ ONCl	Methylphenylurea chloride	R.	Bi.	—	74° 48'	27° 41'	Ax. pl. c(001); Z b	(G)
	C ₈ H ₅ ON ₄	Methoxyphenyltetrazole	Tri.	Bi.	—			Ax. pl. \perp b-axis	(G)
	C ₈ H ₅ O ₂ N ₂	m-Nitroacetanilide	M.	Bi.	—		80° (apprx.)	Ax. pl. \perp b(010)	(G)
2564	C ₈ H ₅ O ₂ N ₂	2, 3-Dinitro-p-xylene	M.	Bi.	+	71° 2'	105° 8'	Ax. pl. \perp b(010)	(G)
	C ₈ H ₅ O ₂ N ₄	9-Allyluric acid	Un.	Bi.	+		53° (apprx.)	Ax. pl. b(010); Z||a	(G)
	C ₈ H ₅ O ₂	Hematinic acid anhydride	R.	Bi.	+		120° 10'	Ax. pl. a(100); X||c	(G)
2649	C ₈ H ₅ O ₇	Acetylcitric anhydride	R.	Bi.	—	88° 36'	110° (apprx.)	Ax. pl. \perp b(010); Z||c	(G)
	C ₈ H ₅ N ₂ Cl ₂ H ₂ O	Phenyliminotriazoline hydrochloride	M.	Bi.	+		90°	Ax. pl. \perp b(010); Z||c = 44° in acute $\angle\beta$	(G)
	C ₈ H ₅ O ₂ SCl	Chloromethyl-p-tolyl sulfone	R.	Bi.	+		31° (apprx.)	Ax. pl. b(010); Z||c	(G)
2657	C ₈ H ₅ ON	Acetanilide	R.	Bi.	+	18° 9'	23° 30'	Ax. pl. b(010); Z||c	(G)
2681	C ₈ H ₅ O ₂ N	p-Acetaminophenol	M.	Bi.	—		84° 30'	Ax. pl. \perp b(010); X||b	(G)
	C ₈ H ₅ O ₄ N	Biliverdic acid	M.	Bi.	—		53° 47'	Ax. pl. \perp b(010); X||c = 55° in obtuse $\angle\beta$	(G)
	C ₈ H ₅ O ₄ N ₂	2, 4-Dinitrodimethylaniline	R.	Bi.	—	18° 9'	55° 19'	Ax. pl. c(001); X||a	(G)
	C ₈ H ₅ O ₂ NCl	Phenylglycocoll hydrochloride	R.	Bi.	—		62° 15'	Ax. pl. b(010); X||a	(G)
	C ₈ H ₅ O ₂	p-Hydroxyphenylethyl alcohol (Tyrosol)	R.	Bi.	—		(Hg, yellow)	Ax. pl. (100); Bx ₂ \perp (001)	(22)
	C ₈ H ₅ O ₂	Dimethylpyrogallol	M.	Bi.	+	18° 9'	47° 29'	Ax. pl. \perp b(010)	(G)
	C ₈ H ₅ NBr	Xylidine hydrobromide	R.	Bi.	—		70° (apprx.)	Ax. pl. b(010); X||a	(G)
	C ₈ H ₅ O ₂ NBr	Tetramethylsuccinic bromoimide	R.	Bi.	—		65° (apprx.)	Ax. pl. (100); Bx ₂ \perp (001)	(22)
	C ₈ H ₅ O ₂ NCl	Tetramethylsuccinic chloroimide	R.	Bi.	—	18° 9'	70° (apprx.)	Ax. pl. (010); Bx ₂ \perp (001)	(22)
	C ₈ H ₅ O ₂ NCl	Vanillylamine hydrochloride	M.	Bi.	—		65° (apprx.)	Ax. pl. a(100); X||c	(G)
	C ₈ H ₅ NI	Ethylaniline hydroiodide	R.	Bi.	—		79° 33'	Ax. pl. c(001); Z||b	(G)
2808.1	C ₈ H ₅ O ₄ N ₂	Tetraacetylhydrazine	R.	Bi.	+	47° 5'	65° (apprx.)	Ax. pl. \perp b(010)	(G)
	C ₈ H ₅ O ₄	trans-Hexahydrotetraphthalic acid	M.	Bi.	—		7° (apprx.)	Ax. pl. c(001); Z||b	(G)
	C ₈ H ₅ O ₄	Norpinic acid	M.	Bi.	+		51° 12'	Ax. pl. \perp b(010)	(G)
	C ₈ H ₅ O ₄	Isopropylisoparaconic acid	M.	Bi.	+	80° 1'	51° 12'	Ax. pl. \perp b(010); Z||c = 83° in obtuse $\angle\beta$	(G)
	C ₈ H ₅ O ₄ N ₂	Lysidine d-tartrate	M.	Bi.	—		80° 1'	Ax. pl. b(010); X||c = 30° in obtuse $\angle\beta$	(G)
	C ₈ H ₅ O ₄ N ₂ Sb ₂ H ₂ O	Ammonium antimonyl tartrate	R.	Bi.	—		68° 8'	Ax. pl. b(010); X||c	(L-B)
2915	C ₈ H ₅ O ₄	Metaldhyde	Tet.	Un.	—	51° 14'		Ax. pl. \perp b(010)	(G)
2916.1	C ₈ H ₅ O ₄	bis-Methoxyacetol	M.	Bi.	—		94° 40'	Ax. pl. b(010); X||a	(G)
2920	C ₈ H ₅ O ₄	d, α -Ethyl glucoside	R.	Bi.	—		94° 41'	Ax. pl. b(010); X||c = 21° in obtuse $\angle\beta$	(G)
	C ₈ H ₅ N ₂ Cl	4, 4-Dimethyl-5-isopropylpyrazoline hydrochloride	M.	Bi.	—	56°	94° 41'	Ax. pl. b(010); X||c = 21° in obtuse $\angle\beta$	(G)
	C ₈ H ₅ N ₂ Cl	Isobutyraldazine hydrochloride	M.	Bi.	—		45° 50'	Z||c	(G)
	C ₈ H ₅ NBr	d-Coniine hydrobromide	R.	Bi.	+		20° 0'	Ax. pl. c(001); Z||b	(G)
2945	C ₈ H ₅ NBr	d-Coniine hydrobromide	R.	Bi.	+	56°	107° 30'	Ax. pl. b(010)	(G)
2946	C ₈ H ₅ NCl	d-Coniine hydrochloride	R.	Bi.	+		(apprx.)	Ax. pl. b(010)	(G)
2948	C ₈ H ₅ NI	d-Coniine hydroiodide	M.	Bi.	—		36° 29'	Ax. pl. b(010); X||a	(G)
	C ₈ H ₅ PI	Tetraethyl phosphonium iodide	Trig.	Un.	—	Small	39°	Ax. pl. b(010); Z||c	(G)
	C ₈ H ₅ OBr ₂	Dibromohydrindone	R.	Bi.	—		22°	Ax. pl. a(100); Z||c	(G)
	C ₈ H ₅ OBr	Phenyl- α -bromoacrolein	R.	Bi.	+		57° (apprx.)	Ax. pl. \perp b(010)	(G)
	C ₈ H ₅ OCl	Phenyl- α -chloroacrolein	R.	Bi.	+	Small	45°	Ax. pl. b(010); X||c	(G)
	C ₈ H ₅ O ₂ Br ₂	Phenylidibromopropionic acid	M.	Bi.	+			Ax. pl. c(001); X||b	(G)
	C ₈ H ₅ O ₂ Cl ₂	Ethyl dichlorosalicylate	R.	Bi.	—			Sections \perp Bx ₂ ; elongation = Z	(42)
3060	C ₈ H ₅ N ₂	3-Aminoquinoline	R.	Bi.	—	Small			
	C ₈ H ₅ O ₄	Acetylsalicylic acid	Tri.	Bi.	—				
	C ₈ H ₅ O ₄	Acetylsalicylic acid	Tri.	Bi.	—				
	C ₈ H ₅ O ₁₂ N ₄	Pentaerythritol nitrate	Tet.	Un.	—	42° 19'	88° 13'	Ax. pl. \perp b(010); X||b	(19)
	C ₈ H ₅ O ₄ N ₂ Br	Bromodinitromesitylene	M.	Bi.	—		24° 3'		(G)
	C ₈ H ₅ Br ₂	Tribromomesitylene	Tri.	Bi.	—		60° (apprx.)	Ax. pl. b(010)	(G)
3103	C ₈ H ₅ O ₂ Cl ₂	1, 3, 5-Trimethyl-1, 3, 5-trichlorocyclohexan-2, 4, 6-trione	M.	Bi.	—	60° (apprx.)		Ax. pl. a(100); X||c	(G)
	C ₈ H ₅ ON	Hydrocarbostryl	R.	Bi.	—				
	C ₈ H ₅ O ₂ N	Benzoylacetohydroxamic acid	M.	Bi.	—			Ax. pl. \perp b(010); X||c = 66° in acute $\angle\beta$	(G)
3111	C ₈ H ₅ O ₂ N	Hippuric acid	R.	Bi.	+	65° 49'	64° (red)	Ax. pl. c(001)	(G)
	C ₈ H ₅ ON ₂	1-Phenyl-3-methylpyrrolidiazoline	R.	Bi.	—		41° 40'	Ax. pl. b(010); X||c	(G)
	C ₈ H ₅ O ₄ N ₂	Isonitrosoanilacetone	R.	Bi.	—		50° (apprx.)	Ax. pl. a(100); X||c	(G)
	C ₈ H ₅ O ₄ N ₂	Dinitromesitylene	R.	Bi.	—	74° 45'		Ax. pl. a(100); X c	(G)
	C ₈ H ₅ O ₄	Dihydrodiacetyllevulinic acid	M.	Bi.	+			Ax. pl. b(010); Z c = 5° in obtuse $\angle\beta$	(G)

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3177	C ₉ H ₁₀ O ₄	<i>d</i> (<i>l</i>)-Phenylglyceric acid.....	M.	Bi.	+		19°	Ax. pl. b(010); ZΛ c = 47° in acute Δβ	(G)
3178	C ₉ H ₁₀ O ₄	<i>d</i> -Phenylglyceric acid.....	M.	Bi.			19°	Ax. pl. (010)	(19)
3179	C ₉ H ₁₀ O ₄	<i>d</i> (<i>l</i>)- <i>p</i> -Methoxymandelic acid.....	M.	Bi.			76° 30' (apprx.)	Ax. pl. b(010)	(G)
	C ₉ H ₁₁ O ₃ Br ₃	Tribromocinnelic anhydride.....	R.	Bi.	+		75° (apprx.)	Ax. pl. a(100); Z||c	(G)
	C ₉ H ₁₁ O ₄ Cl	β-Anhydrocamphoronyl chloride.....	R.	Bi.	+		75° (apprx.)	Ax. pl. c(001); Z||c	(G)
3194	C ₉ H ₁₁ ON	o-Acetotoluide.....	R.	Bi.		58° 28'		Ax. pl. b(010); Z||a	(G)
3196	C ₉ H ₁₁ ON	<i>p</i> -Acetotoluide.....	M.	Bi.	+	88° 30'		Ax. pl. b(010)	(G)
3199	C ₉ H ₁₁ ON	<i>N</i> -Methylacetanilide.....	R.	Bi.	+	51° 41'	87° 8'	Ax. pl. b(010); Z||c	(G)
	C ₉ H ₁₁ O ₂ N	Methyl <i>p</i> -toluohydroxamic acid.....	M.	Bi.	-			Ax. pl. ⊥ b(010); X||b	(G)
	C ₉ H ₁₁ O ₂ N	Phenyl-β-aminopropionic acid.....	M.	Bi.	+		77° 37'	Ax. pl. ⊥ b(010); ZΛ c = 54° in obtuse Δβ	(G)
3220	C ₉ H ₁₁ O ₂ N	Nitromesitylene.....	R.	Bi.	-		65° 32'	Ax. pl. a(100); X||c	(G)
	C ₉ H ₁₁ O ₂ N ₃	ω'-Methyl-ω-phenyl biuret.....	H.	Un.					(8.8)
	C ₉ H ₁₁ O ₂ NS.H ₂ O	Tetrahydroquinoline-5-(ana)-sulfonic acid (St. mod.)	R.	Bi.			110° 39' (apprx.)	Ax. pl. b(010); Z||a	(G)
	C ₉ H ₁₂ ON ₂	Benzylaminooxime ethyl ether.....	R.	Bi.		83° 21'		Ax. pl. c(001); Z||a	(G)
	C ₉ H ₁₂ O ₂ N ₂ .H ₂ O	Benzylamidine acetate.....	M.	Bi.	-		53° 59'	Ax. pl. b(010); XΛ c = 15° in obtuse Δβ	(G)
3232	C ₉ H ₁₂ O ₂ N ₄	1, 3, 7, 9-Tetramethyluric acid.....	M.	Bi.	+	75° 19'		Ax. pl. ⊥ b(010); ZΛ c = 9° 30' in acute Δβ	(G)
	C ₉ H ₁₂ O ₂ S	Ethyl- <i>p</i> -tolyl sulfone.....	R.	Bi.		84°		Z||c	(G)
	C ₉ H ₁₂ O ₂ S	<i>n</i> -Propylphenyl sulfone.....	M.	Bi.	+		30° 10'	Ax. pl. b(010); ZΛ c = 9° in obtuse Δβ	(G)
	C ₉ H ₁₂ O ₂ .3H ₂ O	Trimethylphloroglucinol.....	M.	Bi.	-		80° (apprx.)	Ax. pl. b(010); X ⊥ c(001)	(G)
3251	C ₉ H ₁₂ O ₃	Pyrogallol trimethyl ether.....	R.	Bi.			80° (apprx.)	Ax. pl. b(010); Z||c	(G)
	C ₉ H ₁₂ O ₄	Anhydrocamphoronic acid.....	R.	Bi.	+		76° (apprx.)	Ax. pl. b(010); Z||c	(G)
	C ₉ H ₁₂ O ₄	Methanetetraacetic acid.....	Tet.	Un.					(19)
	C ₉ H ₁₂ NBrCl	<i>m</i> -Chlorophenyltrimethyl ammonium bromide	R.	Bi.	-		3° 35'	Ax. pl. a(100); X||c	(G)
	C ₉ H ₁₂ NCl ₃	<i>m</i> -Chlorophenyltrimethyl ammonium chloride	R.	Bi.	-		24° 59'	Ax. pl. b(010); X||c	(G)
	C ₉ H ₁₂ O ₄ NS	Tetrahydroquinoline sulfate.....	M.	Bi.			71° 2'		(G)
	C ₉ H ₁₂ O ₂ N ₃	Nitrodiaminomesitylene.....	M.	Bi.	+		40° (apprx.)	Ax. pl. b(010)	(G)
	C ₉ H ₁₂ O ₂ N ₃	<i>m</i> -Nitrophenyltrimethyl ammonium nitrate	R.	Bi.			43° 7'	Ax. pl. c(100); Z||c	(G)
	C ₉ H ₁₂ O ₇ NS	Tyrosine sulfate.....	M.	Bi.			86°	Ax. pl. b(010)	(G)
	C ₉ H ₁₂ O ₂ NCl	Veratryl amine hydrochloride.....	M.	Bi.	-		About 60°		(23)
	C ₉ H ₁₄ O ₇ N ₂	Mono-uridihydroxy diethyl succinate.	R.	Bi.		84° 1.5'		Ax. pl. b(010); Z||c	(G)
	C ₉ H ₁₄ O ₇	β-Oxycamphoronic acid (?).....	M.	Bi.	+	80° 17'		Ax. pl. b(010); ZΛ c = 41° 45' in obtuse Δβ	(G)
3293.1	C ₉ H ₁₄ ON	<i>N</i> -Methylgranatone.....	R.	Bi.	+		78° 49'	Ax. pl. b(010); Z||c	(G)
	C ₉ H ₁₄ O ₂ N ₂ .H ₂ O	<i>l</i> -Ecgonine.....	M.	Bi.			70° (apprx.)	Ax. pl. ⊥ b(010).	(G)
	C ₉ H ₁₄ O ₄ N	α-Aminoethylidene diethyl succinate....	R.	Bi.			83° 53'	Ax. pl. b(010); Z||a	(G)
	C ₉ H ₁₄ O ₂ N ₂ SCl ₂ .2H ₂ O	Ergothionine hydrochloride.....	R.	Bi.	-		79°	Ax. pl. c(001); X||b	(G)
	C ₉ H ₁₄ O ₂ N ₂ SI ₂ .2H ₂ O	Ergothionine hydroiodide.....	R.	Bi.	+		70° (apprx.)	Ax. pl. b(010); Z||a	(G)
	C ₉ H ₁₆ O ₂	3, 3, 5-Trimethylhexan-ol-olide.....	R.	Bi.	-	57° 16'		Ax. pl. c(001); X||a	(G)
	C ₉ H ₁₇ O ₂ N ₃	<i>N</i> -Methylpyrrolidine-α, α-dicarboxy methylamide	M.	Bi.	-		93° 14' 110° (apprx.)	Ax. pl. b(010)	(G)
3344	C ₁₀ H ₁₆ O ₇	Galactite.....	R.	Bi.	-	69° 46'		Ax. pl. b(010); X||a	(G)
	C ₁₀ H ₆ OCl ₆	Hexachloro-α-ketohydronaphthalene....	M.	Bi.	-	74° 44'		Ax. pl. ⊥ b(010); XΛ c = 108° (?) in obtuse Δβ	(G)
	C ₁₀ H ₆ OCl ₆	Hexachloro-β-ketohydronaphthalene....	R.	Bi.	+	91° 6' (at axis c)		Ax. pl. a(100); Z||b	(G)
	C ₁₀ H ₆ OCl ₃	Trichloro-α-ketophthalene.....	M.	Bi.	-		113° 20'	Ax. pl. ⊥ b(010); XΛ c = 66° in acute Δβ	(G)
	C ₁₀ H ₆ OCl ₃	α-Trichloro-β-ketophthalene.....	R.	Bi.		57° 6'	93° 34'	Ax. pl. a(100); Z||c	(G)
	C ₁₀ H ₆ OCl ₆	α-Pentachloro-β-ketohydronaphthalene.	M.	Bi.	-			Ax. pl. ⊥ b(010); XΛ c = 17° 57' (?) in acute Δβ	(G)
3404	C ₁₀ H ₆ O ₄ N ₃	1, 3, 5-Trinitronaphthalene.....	R.	Bi.	-		94° 14'	Ax. pl. c(001); X||a	(G)
3495	C ₁₀ H ₆ Cl ₄	Naphthalene tetrachloride.....	M.	Bi.			84° (apprx.)	Ax. pl. ⊥ b(010)	(G)
	C ₁₀ H ₆ O ₂ N ₂	Diisonitrosoisosafral anhydride.....	R.	Bi.	-		62° 14'	Ax. pl. c(001); X||b	(G)
	C ₁₀ H ₆ O ₃	Pinastrinic acid.....	R.	Bi.	+			Ax. pl. a(100); Z||c	(G)
3539	C ₁₀ H ₆ O ₆ S ₂ .4H ₂ O	Naphthalene-1, 5-disulfonic acid.....	M.	Bi.	-	55° 34' (calc.)		Ax. pl. ⊥ (010); nαΛ c = 84° 0.5' in acute Δβ	(41)
3540	C ₁₀ H ₆ O ₆ S ₂ .4H ₂ O	Naphthalene-1, 6-disulfonic acid.....	M.	Bi.		79° 0.5'		Ax. pl. ⊥ (010); nβΛ c = 72°-76° in acute Δβ	(41)
	C ₁₀ H ₆ O ₂ Br	Phenylisobromo butyro lactone.....	M.	Bi.			57° 12'	Ax. pl. ⊥ b(010); ZΛ c = 8° 45' in obtuse Δβ	(G)

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3585	$C_{10}H_9O_3N$	Phthalylethylhydroxylamine.....	R.	Bi.	—		91° 17'	Ax. pl. a(100); X c	(G)
	$C_{10}H_9O_3N$	Phthaloxime ethyl ether.....	R.	Bi.	—		70° (apprx.)	Bxa ⊥ (001)	(24)
	$C_{10}H_9O_3N$	Dimethylnitroterephthalate.....	Tri.	Bi.	—		95° 30'	X ⊥ b(010)	(G)
	$C_{10}H_9O_3N_2$	Nitrodiisooanethol peroxide.....	M.	Bi.	—	73° 48'		Ax. pl. b(010); Z ∧ c = 38° in acute ∠β	(G)
	$C_{10}H_{11}ON_2$	N-Phenyl-3-methylpyrazolone.....	M.	Bi.	—		72° 56'	Ax. pl. ⊥ b(010); Z||b	(G)
	$C_{10}H_{11}O_2N_2$	Diisooanethol anhydride.....	M.	Bi.	—			Ax. pl. ⊥ b(010); Z ∧ c = 40° in acute ∠β	(G)
	$C_{10}H_{11}O_3$	Phenylisooxybutyrolactone.....	M.	Bi.	—			Ax. pl. b(010); Z ∧ c = 96° in obtuse ∠β	(G)
	$C_{10}H_{11}O_4$	2, 4-Dihydroxycinnamic acid.....	M.	Bi.	—		106° 20' (red)	Ax. pl. ⊥ b(010)	(G)
	$C_{10}H_{11}O_4N_2Cl$	Dinitrochlorocymene.....	?	Bi.	+		120°		(27)
	$C_{10}H_{11}O_4N_2Cl$	2-Chloro-5, 6-dinitrocymene.....	M.?	Bi.	—		70°		(27)
	$C_{10}H_{11}ON$	β-β-Dimethyl-α-indolinone.....	R.	Bi.	—	46° 39'	81° 48'	Ax. pl. c(001); X||a	(G)
	$C_{10}H_{11}ON$	β-Ethyl-α-indolinone.....	M.	Bi.	—		38° (apprx.)	Ax. pl. ⊥ b(010)	(G)
	$C_{10}H_{11}O_4N$	Nitrocumic acid.....	M.	Bi.	—	36° 58'	64° 25'	Ax. pl. b(010); X ∧ c = 14° 11' in acute ∠β	(G)
	$C_{10}H_{11}O_2N_2$	p-Aminophenaceturic acid.....	M.	Bi.	—		102° 30'	Ax. pl. ⊥ b(010); X nearly ||c	(G)
	$C_{10}H_{11}O_2N_2$	α-Diisooanethol.....	M.	Bi.	+		30° 45'	Ax. pl. ⊥ b(010)	(G)
3709	$C_{10}H_{11}O_2N_2$	Ethyl Nω-phenyl allophonate.....	M.	Bi.	—				(2, 5)
	$C_{10}H_{11}O_3$	p-Methoxyhydroatropic acid.....	M.	Bi.	+	77° 58'		Ax. pl. b(010); Z ∧ c = 57° in acute ∠β	(G)
	$C_{10}H_{11}O_4$	Cantharidin.....	R.	Bi.	—	89° 7'		Ax. pl. c(001); Z||b	(G)
	$C_{10}H_{11}O_4S$	α-Phenylsulfonebutyric acid.....	R.	Bi.	—	46° 45'		Ax. pl. b(010); X||a	(G)
	$C_{10}H_{11}O_4$	Methyl 4-hydroxy-3, 5-dimethoxybenzoate.....	M.	Bi.	—		63° (apprx.)	Ax. pl. b(010); X ⊥ r(101)	(G)
	$C_{10}H_{11}Br_2$	Tribromocamphene.....	R.	Bi.	—	80° (apprx.)		Ax. pl. c(001); X||b	(G)
	$C_{10}H_{11}ON$	N-Ethylacetanilide.....	R.	Bi.	+		103° 27'	Ax. pl. b(010); Z||c	(G)
	$C_{10}H_{11}O_2N$	Phenacetin.....	M.	Bi.	—	62° 14'		Ax. pl. b(010)	(G)
	$C_{10}H_{11}O_2N$	p-Tolyl urethane.....	M.	Bi.	—		59° 46'	Ax. pl. b(010); X ∧ c = 27° in acute ∠β	(G)
	$C_{10}H_{11}O_2N$	Vanillyl acetamide.....	M.	Bi.	+		110° (115° calc.)		(24)
	$C_{10}H_{14}$	1, 2, 4, 5-Tetramethylbenzene.....	M.	Bi.	—	87° 22'		Ax. pl. b(010); X ∧ c = 0° 54' in obtuse ∠β	(G)
	$C_{10}H_{14}O_2Br$	d-Bromopseudonitrocaphor.....	R.	Bi.	+	79° (apprx.)		Ax. pl. c(001); Z||a	(G)
	$C_{10}H_{14}OBr_2$	d-α, α'-Dibromocamphor.....	R.	Bi.	—	56° 5'	90° 38'	Ax. pl. a(100); X||b	(G)
	$C_{10}H_{14}OBr_2$	d-α, β-Dibromocamphor.....	R.	Bi.	—	77° 51'		Ax. pl. b(010); X||c	(G)
	$C_{10}H_{14}OCl_2$	d-α, π-Dichlorocamphor.....	R.	Bi.	+		62° 18'	Z||c	(G)
3742	$C_{10}H_{14}OSCl_2$	d-α-Chloro-π-camphosulfonic chloride.....	R.	Bi.	—	59° (apprx.)		Ax. pl. a(100); Z||b	(G)
	$C_{10}H_{14}O_2N_2S_2$	Ammonium naphthalene-1, 5-disulfonate.....	M.	Bi.	+	49° 40'		Ax. pl. ⊥ (010)	(41)
	$C_{10}H_{14}O$	Thymol.....	Trig.	Un.	+				(G)
	$C_{10}H_{14}O_2$	d(l)-Camphoric anhydride.....	R.	Bi.	—		31° 20' (red)	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{14}O_4$	Tetramethylapionol.....	R.	Bi.	+	49° 13'	80° 1'	Ax. pl. a(100); Z||c	(G)
	$C_{10}H_{14}O_4$	Methyl α-anhydrocamphoronate.....	R.	Bi.	—		120° (apprx.)	Ax. pl. a(100); X||b	(G)
	$C_{10}H_{14}O_4$	Methyl β-anhydrocamphoronate.....	R.	Bi.	—		33° (apprx.)	Ax. pl. a(100); X||b	(G)
	$C_{10}H_{14}O_2$	Dimethyl diacetylacemate.....	R.	Bi.	+	62° 36'	103° 29'	Ax. pl. c(001); Z||b	(G)
	$C_{10}H_{14}OBr$	d-β-Bromocamphor.....	R.	Bi.	+	76° (apprx.)		Ax. pl. a(100); Z||c	(G)
	$C_{10}H_{14}O_2N_2Br$	α-Bromopernitrosocamphor.....	R.	Bi.	+		99° 28'	Ax. pl. b(010); Z||c	(G)
	$C_{10}H_{14}O_2N_2Br$	β-Isobromopernitrosocamphor.....	R.	Bi.	+		69° 20'	Ax. pl. a(100); Z||c	(G)
	$C_{10}H_{14}OBr_2$	d(l)-Dihydrocarvone tribromide.....	R.	Bi.	+		59° 45'	Ax. pl. (100); Z||c	(G)
	$C_{10}H_{14}OSBr$	d-π-Camphoric sulfonyl bromide.....	R.	Bi.	+		35°		(G)
	$C_{10}H_{14}OSCl$	d-π-Camphoric sulfonyl chloride.....	R.	Bi.	+		45° (apprx.)		(G)
	$C_{10}H_{14}ON$	l-Ratanhin sulfate.....	R.	Bi.	—		75° (apprx.)	Ax. pl. c(001)	(G)
3779	$C_{10}H_{14}NBr$	Diethylaniline hydrobromide.....	M.	Bi.	—	77° 33'		Ax. pl. ⊥ b(010); X ∧ c = 70° in obtuse ∠β	(G)
	$C_{10}H_{14}OBr_2$	Pinol dibromide.....	R.	Bi.	—		131° 21'	Ax. pl. a(100); X||c	(G)
	$C_{10}H_{14}NI$	p-Tolyltrimethylammonium iodide.....	R.	Bi.	+		20° 36'	Ax. pl. b(010); Z||c	(G)
	$C_{10}H_{16}O_3$	dl-Pinonic acid.....	M.	Bi.	—	88° 32'		Ax. pl. b(010); Z ∧ c = 57° in acute ∠β	(G)
	$C_{10}H_{16}O_3$	d-α-Thugene ketonic acid.....	R.	Bi.	+		74° 14'	Ax. pl. a(100); Z||c	(G)
	$C_{10}H_{16}O_3$	Isoketocamphoric acid.....	M.	Bi.	+		80° (apprx.)	Ax. pl. b(010); Z nearly ⊥ c(001)	(G)
	$C_{10}H_{16}O_4H_2O$	l-Cineolic acid.....	R.	Bi.	—	25° 30'		Ax. pl. b(010); X c	(G)
	$C_{10}H_{17}ON$	dl-α-Pinoneoxime.....	M.	Bi.	+		60°-70°	Ax. pl. b(010); Z ∧ c = 10° in acute ∠β	(G)
3873									
3886.1									

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	$C_{10}H_{16}O_2$	2-Hydroxy- Δ^1 , 3- <i>p</i> -menthenone.....	M.	Bi.	—			$X \wedge c = 63^\circ 6'$ in obtuse $\angle \beta$	(G)
	$C_{10}H_{16}O_4$	α , α' -Methylisopropyl- α , α' -dihydroxyadipic acid.....	?	Bi.	—		75°		(37)
	$C_{10}H_{15}ON$	Δ^8 , 8-Methylnonenyl amide.....		Bi.	+		60°		(23)
3964	$C_{10}H_{18}ONCl$	Lupinine hydrochloride.....	R.	Bi.	+	59° 18'	102° 10'	Ax. pl. c(001); $Z \parallel a$	(G)
	$C_{10}H_{18}O_2N_2 \cdot 3H_2O$	α -2, 5-Dimethylpiperazine tartrate.....	M.	Bi.			80°	Ax. pl. $\perp b(010)$	(G)
	$C_{10}H_{18}NPS$	Triethylallylphosphothiourea.....	M.	Bi.	—	72° 30'	(apprx.)	Ax. pl. b(010); $X \wedge c = 24^\circ$ in acute $\angle \beta$	(G)
	$C_{10}H_{16}O_2$	<i>cis</i> -Terpine hydrate.....	R.	Bi.	+	77° 27'		Ax. pl. b(010); $Z \parallel a$	(G)
3980	$C_{10}H_{16}O_2$	<i>trans</i> -Terpine.....	M.	Bi.	+		74° 15'	Ax. pl. $\perp b(001)$; $Z \wedge c = 5^\circ$ in acute $\angle \beta$	(G)
	$C_{11}H_{16}O_{10} \cdot 5H_2O$	Benzenepentacarboxylic acid.....	R.	Bi.	—		57° 30'	Ax. pl. b(010); $X \parallel c$	(G)
	$C_{11}H_8N_4O_2$	9-Phenyluric acid.....		Un.					(8.5)
	$C_{11}H_8O_4Br$	Phenylbromoparaconic acid.....	R.	Bi.		56° 50'		Ax. pl. b(010); $Z \parallel a$	(G)
	$C_{11}H_9O_2N$	Citraconanil.....	M.	Bi.	+		14° 56'	Ax. pl. b(010)	(G)
	$C_{11}H_{11}O_2Cl_3$	Trichloromethyl- α -methoxyphenylcarbinol acetic ether.....	M.	Bi.	—		75° 11'	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{11}O_2N$	Glutaric aniline.....	M.	Bi.			90°	Ax. pl. (010)	(28)
4043.1	$C_{11}H_{11}ON_2Br$	4-Bromoantipyrine.....	Ditrig.	Un.					(G)
	$C_{11}H_{11}O_2N$	β -Benzyl malimide.....	R.	Bi.	—	62°-66°		Ax. pl. b(010); $X \parallel c$	(G)
4053	$C_{11}H_{11}O_4N$	Ethyl α -nitrocinnamate.....	R.	Bi.	—		57° 40'	Ax. pl. c(001); $X \parallel a$	(G)
	$C_{11}H_{11}ON_2$	4-Iodoantipyrine.....	Trig.	Un.					(G)
	$C_{11}H_{11}O_2Br_2$	Ethyl dibromocinnamate.....	M.	Bi.	—	86° (apprx.)		Ax. pl. b(010); $X \wedge c = 7^\circ$ in acute $\angle \beta$	(G)
4058	$C_{11}H_{15}ON_2$	Antipyrine.....	?	Bi.		54° 20'	103° 21'		(L-B)
	$C_{11}H_{15}O_2N_2$	4-Hydroxyantipyrine.....	M.	Bi.			116° 23'	Ax. pl. b(010); $Z \perp c(001)$	(G)
	$C_{11}H_{15}O_3N$	Methyl phenacetate.....	R.	Bi.				Ax. pl. b(010)	(G)
4086	$C_{11}H_{15}ON_2$	Cytisine.....	R.	Bi.	+	61° 36.5'		Ax. pl. a(100); $Z \parallel c$	(G)
	$C_{11}H_{15}O_2N_2$	Ethyl α -phenylhydrazine pyrrolacetate.....	M.	Bi.	—			Ax. pl. $\perp b(010)$; $X \wedge c = 47^\circ 4'$ in acute $\angle \beta$	(G)
	$C_{11}H_{14}O_4$	Methyl 3, 4, 5-methoxybenzoate.....	M.	Bi.			113° 13' (white)	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{15}ON_2Br \cdot H_2O$	Cytisine hydrobromide.....	M.	Bi.	—	87° (apprx.)		Ax. pl. b(010)	(G)
	$C_{11}H_{15}O_2NCl$	Methyl 3, 4, 5-trimethoxy-2-aminobenzoate.....	R.	Bi.	—		70° (apprx.)	Ax. pl. c(001); $X \parallel a$	(G)
	$C_{11}H_{15}ON_2Cl \cdot H_2O$	Cytisine hydrochloride.....	M.	Bi.		72° (apprx.)		Ax. pl. b(010); $Z \wedge c = 55^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{15}O_2N$	Vanillyl propionamide.....	R.	Bi.	—		100° (98° calc.)		(24)
	$C_{11}H_{15}O_2N$	Pyrocatechol carboxyl diethylamide.....	M.	Bi.	+		7° 56'	Ax. pl. b(010); $Z \wedge c = 55^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{15}ON$	α -Benzylhydroxylamine ditartrate.....	R.	Bi.			90° (apprx.)	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{11}H_{15}O_2N_2$	Nitrosoamylene nitroaniline.....	R.	Bi.	+	82° 51'		Ax. pl. b(010); $Z \parallel c$	(G)
	$C_{11}H_{15}O_4N_2 \cdot H_2O$	Cytisine nitrate.....	M.	Bi.	+	38° 49'		Ax. pl. b(010)	(G)
	$C_{11}H_{15}ON_2$	Amylene nitraniline.....	R.	Bi.	+	88° 21'		Ax. pl. a(100); $Z \parallel c$	(G)
	$C_{11}H_{15}O_4$	Dimethyl camphorone.....	R.	Bi.	—		50° (apprx.)	Ax. pl. b(010); $X \parallel a$	(G)
	$C_{11}H_{17}ON_2Cl$	Amylene nitraniline hydrochloride.....	M.	Bi.	+	75° 41'		Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{15}NBr$	Diethyl- <i>p</i> -toluidine hydrobromide.....	M.	Bi.	+	69° 41.5'		Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{15}O_4$	Ethyl camphorone.....	M.	Bi.			56° (apprx.)	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{15}O_2$	Triethyl desoxalate.....	M.	Bi.	—		61° 59'	Ax. pl. $\perp b(010)$	(G)
	$C_{11}H_{16}ON_2$	Terpinene nitrolmethylamine.....	M.	Bi.		55° 20'	93° 56'	Ax. pl. $\perp b(010)$; $Z \wedge c = 31^\circ$ in obtuse $\angle \beta$	(G)
	$C_{11}H_{15}O_2N$	<i>N</i> -Methyl-2, 2, 6, 6-tetramethyl-4-hydroxypiperidine carboxylic acid.....	R.	Bi.	—	82° 31'		Ax. pl. a(100); $X \parallel b$	(G)
4184	$C_{12}H_8$	Acenaphthylene.....	R.	Bi.	+	70° 16'	114° 46'	Ax. pl. a(100); $Z \parallel b$	(G)
4185.1	$C_{12}H_8Br_2$	<i>p</i> , <i>p'</i> -Dibromodiphenyl.....	M.	Bi.		50°-60° (apprx.)		Ax. pl. $\perp b(010)$	(G)
4218	$C_{12}H_{10}$	Acenaphthene.....	R.	Bi.	+	70° 26'	115° 40'	Ax. pl. a(100); $Z \parallel b$	(G)
4221.1	$C_{12}H_{10}Cl$	Diphenyliodonium chloride.....	M.	Bi.			Large	Ax. pl. b(010)	(G)
4225	$C_{12}H_{10}N_2$	Asobenzene.....	M.	Bi.	+		59° 5'	Ax. pl. $\perp b(010)$; $Z \wedge c = 62^\circ$ in acute $\angle \beta$	(G)
	$C_{12}H_{15}ON_2$	α -Benzoylpyridine oxime.....	R.	Bi.		66°		Ax. pl. b(010); $Z \parallel a$	(G)
	$C_{12}H_{15}ON_2$	γ -Benzoylpyridine oxime.....	M.	Bi.		28°		Ax. pl. b(010); $Z \wedge c = 62^\circ$ in obtuse $\angle \beta$	(G)
	$C_{12}H_{10}O_4S_4$	Benzenesulfone trisulfide.....	Tet.	Un.					(G)
4261	$C_{12}H_{10}S_2$	Diphenyl disulfide.....	R.	Bi.	—		85° (apprx.)	Ax. pl. b(010); $X \parallel c$	(G)
	$C_{12}H_{11}O_2SBr$	Ethyl 1, 5-bromonaphthalene sulfonate.....	R.	Bi.			29° 52'	Ax. pl. a(100); $Z \parallel b$	(G)
	$C_{12}H_{11}O_2SCl$	Ethyl 1, 5-chloronaphthalene sulfonate.....	M.	Bi.		42° (apprx.)		Ax. pl. b(010)	(G)
	$C_{12}H_{11}ON$	α -Phenylpyridyl carbinol.....	R.	Bi.		65°		Ax. pl. c(001); $Z \parallel a$	(G)

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4272	$C_{12}H_{11}O_2NS$	Benzenesulfanilide.....	Tet.	Un.					(G)
	$C_{12}H_{11}O_2N$	Vanillyl <i>n</i> -butyramide.....	Tri.	Bi.	+				(24)
	$C_{12}H_{11}O_2N$	Vanillyl isobutyramide.....	R.	Bi.	-				(24)
	$C_{12}H_{11}O_2$	Ethyl β -methylcoumarilate.....	R.	Bi.					(G)
	$C_{12}H_{11}O_2$	<i>cis</i> -Dimethylsuccinic acid.....	R.	Bi.					(28)
	$C_{12}H_{11}O_2$	Acetotetrahydrocinchoninic acid.....	R.	Bi.	-				(G)
	$C_{12}H_{14}NI$	Tetrapropyl ammonium iodide.....	R.	Bi.	-				(G)
	$C_{12}H_{14}NI$	1, 3, 3-Trimethyl-2-methylene indoline hydriodide.....	R.	Bi.	-	23° 48' (red)	57° 16' (red)	Ax. pl. c(110); X||b	(G)
	$C_{12}H_{14}ON_2$	1-Phenyl-3-methyl-4-dimethylpyrazolone.....	M.	Bi.		74° 2'		Ax. pl. \perp b(010)	(G)
	$C_{12}H_{14}ON_2$	4-Methylantipyrine.....	M.	Bi.		86° (apprx.)		Ax. pl. b(010); $Z \wedge c = 47^\circ$ in acute $\angle\beta$	(G)
4318.1	$C_{12}H_{14}O_2$	Ethyl <i>p</i> -methoxycinnamate.....	M.	Bi.					(G)
	$C_{12}H_{14}O_2$	Dimethyl phenylsuccinate.....	M.	Bi.	+		10° (apprx.)	Ax. pl. \perp b(010)	(G)
	$C_{12}H_{15}ON_2I$	1-Phenyl-3-methyl-5-methoxypyrazole 2-methiodide.....	M.	Bi.	-	72°		Ax. pl. b(010); $X \wedge c = 73^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}ON_2I$	Antipyrine pseudomethiodide.....				75° 44'			(L-B)
	$C_{12}H_{15}ON_2I$	Antipyrine pseudoethiodide.....	M.	Bi.	+	74° 45'		Ax. pl. b(010); $Z \wedge c = 84^\circ 30'$ in obtuse $\angle\beta$	(G)
4330.1	$C_{12}H_{15}ON$	7-Isopropylhydrocarboestryl.....	R.	Bi.		64° 51'		Ax. pl. b(010); Z||a	(G)
	$C_{12}H_{15}O_2N$	Ethyl phenacetate.....	R.	Bi.				Ax. pl. b(010)	(G)
	$C_{12}H_{15}O_2N$	Vanillyl crotonylamide.....	R.	Bi.	+				(24)
	$C_{12}H_{15}O_2$	2, 5-Dioxyacetophenone diethyl ether.....	Tri.	Bi.			Large 85° (apprx.)	Ax. pl. \perp c(001)	(G)
	$C_{12}H_{17}O_2N_3$	Nitrosoamylenenitrol- <i>p</i> -toluidine.....	R.	Bi.	+	77° 50'		Ax. pl. \perp b(010); Z||c	(G)
4368.3	$C_{12}H_{15}ON_2Cl$	Amylenenitrol- <i>p</i> -toluidine hydrochloride.....	M.	Bi.	+	59° 26'	97° 30'	Ax. pl. \perp b(010); $Z \wedge c = 12^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}ON_2$	Amylenenitrol- <i>p</i> -toluidine.....	M.	Bi.	-		72° 40'	Ax. pl. b(010); $X \wedge c = 35^\circ$ in acute $\angle\beta$	(G)
	$C_{12}H_{15}O_4$	Dimethylcantharidin.....	R.	Bi.	+		116°	Ax. pl. b(010)	(G)
	$C_{12}H_{15}O_4$	Diethyl 1, 1-diaceto succinate.....	M.	Bi.	+	64° (apprx.)		Ax. pl. b(010)	(G)
	$C_{12}H_{16}O$	Matico camphor.....	Trig.	Un.					(G)
4394	$C_{12}H_{16}OS_2$	Methyl <i>l</i> -bornyl xanthate.....	R.	Bi.	-	33° 24'		Ax. pl. b(010); X||a	(G)
	$C_{12}H_{16}ON_2$	Terpinene nitroethylamine.....	M.	Bi.		70° 53'	128° 32'	Ax. pl. \perp b(010); $Z \wedge c = 26^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{16}O$	Lactose.....	M.	Bi.	-		33° 35'	Ax. pl. \perp b(010); $X \wedge c = 10^\circ-11^\circ$ in obtuse $\angle\beta$	(G)
4396	$C_{12}H_{17}O_{11}$	Saccharose.....	M.	Bi.	-	48° 0'	79° 7'	Ax. pl. b(010); $X \wedge c = 67^\circ 45'$ in obtuse $\angle\beta$	(G)
4397	$C_{12}H_{22}O_{11} \cdot 2H_2O$	Trehalose.....	R.	Bi.	+	50° 16'	78° 56'	Ax. pl. b(010); Z||c	(G)
	$C_{12}H_{22}O_{11} \cdot 2H_2O$	<i>d</i> -Coniine ditartrate.....	R.	Bi.	+		43° 33'	Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{22}O_{11} \cdot N_4 \cdot 9H_2O$	Ammonium mellitate.....	R.	Bi.	-		17° (apprx.)	Ax. pl. b(010) (red); X||c	(G)
4434	$C_{12}H_8O_2Cl_2$	Phenyl 3, 5-dichlorosalicylate.....	R.	Bi.	-		70° 35'	Ax. pl. a(100); X||c	(G)
	$C_{12}H_8N$	Acridine.....	R.	Bi.			117° (apprx.)	Ax. pl. c(001); Z||a	(G)
	$C_{12}H_{16}N_2$	Benzenyl- <i>o</i> -phenylenediamine.....	M.	Bi.	+		63°	Ax. pl. b(010); Z nearly \perp c(001)	(G)
4454	$C_{12}H_{10}O_2$	<i>p</i> -Hydroxybenzophenone.....	R.	Bi.	-		96° 20'	Ax. pl. b(010); X||a	(G)
	$C_{12}H_9O_2Br$	Phenyl <i>m</i> -bromobenzoate.....	R.	Bi.	+		41° 4'	Ax. pl. b(010); Z||c	(G)
	$C_{12}H_{11}O_4NS$	<i>p</i> -Aminobenzophenone- <i>p'</i> -sulfonic acid.....	M.	Bi.				Ax. pl. ||(010); Z = c	(8)
	$C_{12}H_{15}O_4Br_2$	Ethyl dibromohydroxydimethylisocoumarilate.....	M.	Bi.			80° (apprx.)	Ax. pl. b(010); $Z \wedge c = 30^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_4Cl_2$	Ethyl dichlorohydroxydimethylcoumarilate.....	M.	Bi.			75° (apprx.)	Ax. pl. \perp b(010); $Z \wedge c = 30^\circ-35^\circ$ in obtuse $\angle\beta$	(G)
4500	$C_{12}H_{15}ON_2$	<i>p</i> -Hydroxy- <i>p'</i> -methylazobenzene.....	M.	Bi.	-		52° 30' (apprx.)	Ax. pl. b(010); $X \wedge c = 57^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_2N_4$	1, 3-Dimethyl-9-phenyluric acid.....		Bi.			Large		(21)
4509	$C_{12}H_{15}O_2N_4$	1, 3-Dimethyl-9-phenylpseudouric acid.....		Bi.			Large		(21)
	$C_{12}H_{15}O_2N_4S$	Phenyl <i>p</i> -toluene sulfonate.....	R.	Bi.	-		84° 19'	Ax. pl. a(100); X||b	(G)
	$C_{12}H_{15}O_4N$	Acetanilopyrotartaric anhydride.....	M.	Bi.			86° 2'	Ax. pl. \perp b(010); Z \perp c(001)	(G)
	$C_{12}H_{15}O_4$	Ethyl hydroxydimethylisocoumarilate.....	R.	Bi.	+		65° (apprx.)	Ax. pl. c(001); Z||a	(G)
4530.1	$C_{12}H_{15}ON_2$	4-Ethylantipyrine.....	M.	Bi.			30° (apprx.)	Ax. pl. b(010); $Z \wedge c = 40^\circ$ in obtuse $\angle\beta$	(G)
4530.2	$C_{12}H_{16}ON_2$	1-Phenyl-2-propyl-3-methylpyrazolone.....	M.	Bi.		52° 50'	79° 59'	Ax. pl. \perp b(010); Z||b	(G)
	$C_{12}H_{16}O_{10}$	Glycogallin.....	M.	Bi.	-		55° (apprx.)	Ax. pl. b(010); $X \wedge c = 16^\circ$ in obtuse $\angle\beta$	(G)
	$C_{12}H_{17}ON_2I$	1-Phenyl-3-methyl-5-ethoxypyrazole-2-methiodide.....	M.	Bi.	-		88° (apprx.)	Ax. pl. \perp b(010); X||b	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
	$C_{12}H_{10}NCl$	2-Methyl-3, 3-diethyl-2, 3-dihydroindol hydrochloride	M.	Bi.	—	81° 51'			(G)
	$C_{12}H_{10}NI$	Methylethylallyl- <i>p</i> -tolyl ammonium iodide	R.	Bi.			89° (apprx.)	Ax. pl. c(001); Z||c	(G)
	$C_{12}H_{10}O_3$	Pentaerythritol tetraacetate	Tet.	Un.					(19)
	$C_{12}H_{12}OS_2$	Ethyl <i>dl</i> -bornylxanthate	R.	Bi.	—		51° 16'	Ax. pl. b(010)	(G)
	$C_{14}H_7O_4N_2Cl_4$	Dinitrodichlorodiphenyltrichloroethane	M.	Bi.	—		58° (apprx.)	Ax. pl. b(010); $X \wedge c = 28^\circ 30'$ in obtuse $\angle \beta$	(G)
	$C_{14}H_9Cl_2Br_2$	1, 1-Di(bromophenyl)-2-dichloroethylene	R.	Bi.	+		34° 22'	Ax. pl. c(001); Z||a	(G)
	$C_{14}H_9Cl_4$	1, 1-Di(chlorophenyl)-2-dichloroethylene	R.	Bi.	+		34° 26'	Ax. pl. b(010); Z||a	(G)
	$C_{14}H_9Cl_2Br_2$	1, 1-Di(bromophenyl)-2-trichloroethane	R.	Bi.	+		62° 12'	Ax. pl. c(001); Z||b	(G)
4650	$C_{14}H_{10}$	Diphenylacetylene	M.	Bi.			42° (red)	Ax. pl. $\perp b(010)$	(G)
	$C_{14}H_{10}Cl_2$	1, 1-Diphenyl-2-dichloroethylene	M.	Bi.	—		30° 50'	Ax. pl. $\perp b(010)$	(G)
4656.1	$C_{14}H_{10}O_2N_2$	Phthalylphenylhydrazine (orange yellow)	M.	Bi.			85° (apprx.)	Ax. pl. $\perp b(010)$	(G)
4672	$C_{14}H_{10}O_2$	Benzil	Trig.	Un.					(G)
4681	$C_{14}H_{10}O_2$	Disalicylaldehyde	M.	Bi.					(G)
4688	$C_{14}H_{10}O_4$	Benzoyl peroxide	R.	Bi.				Ax. pl. a(100); Z||b	(G)
	$C_{14}H_{11}Br_3$	Diphenyltribromoethane	M.	Bi.	+		110°	Ax. pl. a(100)	(G)
4705	$C_{14}H_{11}O_2N$	Dibenzohydroxamic acid	R.	Bi.	+		54° 35' (red)	Ax. pl. a(100); Z||b	(G)
4708	$C_{14}H_{12}$	Stilbene	M.	Bi.	+		91° 33'	Ax. pl. $\perp b(010)$; $Z \wedge c = 60^\circ$ in acute $\angle \beta$	(G)
	$C_{14}H_{12}N_4$	1, 5-Diphenyl-3-iminotriazoline	M.	Bi.				Ax. pl. b(010)	(G)
	$C_{14}H_{12}O$	Phenyl <i>p</i> -tolyl ketone	M.	Bi.	—		35° 15'	Ax. pl. $\perp b(010)$; $X \wedge c = 36^\circ 57'$ in acute $\angle \beta$	(G)
	$C_{14}H_{12}N$	<i>o</i> -Iminodibenzyl	M.	Bi.			69° 58.5'	Ax. pl. $\perp b(010)$	(G)
4748	$C_{14}H_{12}ON$	<i>N</i> -Benzoyl- <i>o</i> -toluidine	R.	Bi.	+	87° 33'		Ax. pl. a(100)	(G)
4749	$C_{14}H_{12}ON$	<i>N</i> -Benzoyl- <i>m</i> -toluidine	M.	Bi.	—		38° 10'	Ax. pl. $\perp b(010)$	(G)
4750	$C_{14}H_{12}ON$	<i>N</i> -Benzoyl- <i>p</i> -toluidine	R.	Bi.		73° 43'		Ax. pl. c(001); Z||b	(G)
4752	$C_{14}H_{12}ON$	<i>N</i> -Diphenylacetamide	R.	Bi.	+	52° 2'		Ax. pl. c(001); Z||a	(G)
	$C_{14}H_{12}O_2N_2$	<i>o</i> -Nitrobenzyl- <i>o</i> -toluidine	R.	Bi.			49° (red)	Ax. pl. a(100); Z||b	(G)
	$C_{14}H_{12}O_2N_2$	ω, ω' -Diphenylbiuret		Bi.					(8.5)
	$C_{14}H_{12}ON_2$	Phenyl- <i>o</i> -phenetol	M.	Bi.	—	68°	154° (apprx.)	Ax. pl. $\perp b(010)$; $X \wedge c = 39^\circ$ in acute $\angle \beta$	(G)
4783	$C_{14}H_{14}O_2$	Isobenzobenzoin	M.	Bi.	—	84° 59'		Ax. pl. $\perp b(010)$	(G)
	$C_{14}H_{14}O_2$	1, 2-Dihydroxyphenylethane	R.	Bi.	+		122° 14'	Ax. pl. (100)	(9)
	$C_{14}H_{14}O_2$	<i>o, o'</i> -Dimethoxydiphenyl	R.	Bi.			5°	Ax. pl. (010); $Bx_a \perp c(001)$	(20)
	$C_{14}H_{14}O_2S_2$	Tolyl <i>p</i> -toluol thiosulfonate	M.	Bi.			19° 29'	Ax. pl. $\perp b(010)$; Z||b	(G)
	$C_{14}H_{14}O_4S_4$	<i>p</i> -Toluenesulfone trisulfide	Tet.	Un.					(G)
4787	$C_{14}H_{14}S$	Dibenzyl sulfide	R.	Bi.	—	67° 38'		Ax. pl. b(010); X||c	(G)
	$C_{14}H_{14}NO_4Br \cdot H_2O$	Dipyridinebetaine hydrobromide	R.	Bi.	+	87° 30'		Ax. pl. c(001); Z||b	(G)
	$C_{14}H_{14}ONCl \cdot H_2O$	Dipyridinebetaine hydrochloride	R.	Bi.	+	83° 52'		Ax. pl. c(001); Z||b	(G)
	$C_{14}H_{16}ONCl$	Diphenylhydroxyethylamine hydrochloride	H.	Un.	—				(G)
	$C_{14}H_{16}O_4$	β -Methyltetramethoxycinnamic acid	M.	Bi.	+		102° 4'	Ax. pl. $\perp b(010)$; $Z \perp c(001)$	(G)
	$C_{14}H_{16}O_7N$	Thallin tartrate	R.	Bi.	+	78° 14'		Ax. pl. a(100)	(G)
	$C_{14}H_{16}O_2NI$	Ethyl tetrahydroquinoline- <i>N</i> -acetate methiodide	M.	Bi.			65° 70'	Ax. pl. $\perp b(010)$	(G)
	$C_{14}H_{16}O_2$	Phenylcoumarin	M.	Bi.				Ax. pl. b(010); $Z \wedge c = 30^\circ 15'$ in acute $\angle \beta$	(G)
	$C_{14}H_{12}N_2$	3, 5-Diphenylpyrazole	M.	Bi.			43° 30'	Ax. pl. $\perp b(010)$; $Z \wedge c = 44^\circ$ in acute $\angle \beta$	(G)
	$C_{14}H_{12}O_2N$	<i>syn</i> -Benzoylbenzohydroxamic methyl ether	R.	Bi.	—	70° 10'		Ax. pl. a(100); X||c	(G)
	$C_{14}H_{12}O_2$	<i>o</i> -Hydroxydibenzoylmethane	M.	Bi.	+		75°	Ax. pl. (010); $Bx_a \parallel c$ -axis	(22)
4919	$C_{14}H_{12}O_2$	Methyl bensilate	M.	Bi.	—		74° 52'	Ax. pl. $\perp b(010)$	(G)
	$C_{14}H_{12}O_2N$	Vanillyl benzoyl amide	R.	Bi.	—		85° (89° calc.)		(24)
	$C_{14}H_{14}O_4NS \cdot H_2O$	<i>p</i> -Dimethylaminobenzophenone sulfonic acid	Tri.	Bi.			79° (apprx.)	Ax. pl. ||m(110)	(G)
	$C_{14}H_{16}O_4$	2, 6, 2', 5'-Tetrahydroxydiphenylmethyl ethyl ether	R.	Bi.		79° 11'		Ax. pl. a(100); Z||b	(G)
4936.1	$C_{14}H_{16}O_4 \cdot H_2O(?)$	Picrotoxinin	R.	Bi.				Ax. pl. c(001)	(G)
	$C_{14}H_{16}O_2$	Hyposantonin	R.	Bi.			46° (apprx.)	Ax. pl. b(010); Z||b(?)	(G)
4943	$C_{14}H_{16}O_2$	Santonin	R.	Bi.	+		41° 17'–43° 33'	Ax. pl. a(100); Z||b	(27)
	$C_{14}H_{16}O_2$	Santonide	R.	Bi.	+	67° 1' (red)		Ax. pl. a(100); Z||c	(G)
	$C_{14}H_{16}O_2$	Parasantonide	R.	Bi.	—		59° 25' (red)	Ax. pl. a(100); X||c	(G)
	$C_{14}H_{16}O_4$	Triethyl trimesate	H.	Un.	—				(G)
	$C_{14}H_{16}O_2N_2Cl_2$	Butyl chloral antipyrine	Tri.	Bi.	—		110°		(G)
	$C_{14}H_{16}O_2$	Hydrosantonide	R.	Bi.	+	55° 10' (red)	93° 43' (red)	Ax. pl. a(100); Z c	(G)

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4960	C ₁₀ H ₁₀ O ₄	Santonin acid.....	R.	Bi.		87° 40'		Ax. pl. a(100)	(G)	
	C ₁₀ H ₁₀ O ₄	Metasantoinic acid.....	R.	Bi.	+		68° 25' (red)	Ax. pl. a(100); Z c	(G)	
	C ₁₀ H ₁₀ O ₄	Parasantoinic acid.....	R.	Bi.	-	88° 13' (red)		Ax. pl. a(100); X||c	(G)	
	C ₁₀ H ₁₁ O ₂ N	α-Isopropylglutaranilic acid.....	R.	Bi.	+		117° 15'	Ax. pl. b(010); Z||c	(G)	
	C ₁₀ H ₁₁ O ₂ N ₂	Physostigmine.....	R.	Bi.	-	77° 42'		Ax. pl. b(010); X||c	(G)	
	C ₁₀ H ₁₀ O ₄	Hydrosantonin acid.....	R.	Bi.	+		100° (red)	Ax. pl. a(100); Z||c	(G)	
	C ₁₀ H ₁₀ O ₄	Photosantonin acid.....	R.	Bi.	-		107° 25' (red)	Ax. pl. a(100); X||c	(G)	
	C ₁₀ H ₁₂ O ₂ N	Vanillyl <i>n</i> -heptoylamide.....	M.	Bi.	-		110° (107° calc.)		(24)	
	C ₁₀ H ₁₄ O(?)	Juniperol.....	Tri. (?)	Bi.	-	34° 46'		Ax. pl. nearly ||b(010); XΛc = 72° in acute ∠β	(G)	
	C ₁₀ H ₁₆ O ₂ N	Sesquiterpene nitrate.....	R.	Bi.			18° 32'	Ax. pl. a(100) (red)	(G)	
4997	C ₁₀ H ₁₆ Cl ₂	<i>l</i> -Cadinene dihydrochloride.....	R.	Bi.	+		50° (apprx.)	Ax. pl. b(010); Z||c	(27)	
	C ₁₀ H ₁₆ O	Cypress camphor.....	R.	Bi.	+		61° 30'	Ax. pl. b(010); Z||a	(G)	
	C ₁₀ H ₁₆ O	Cedrol.....	R.	Bi.	+		64° 45'	Ax. pl. b(010); Z||a	(G)	
	C ₁₀ H ₁₆ O ₆	Triacetone mannite.....	M.	Bi.	+	77° 4'	138° 13'	Ax. pl. ⊥b(010); ZΛc = 26° 54' in obtuse ∠β	(G)	
5028.1	C ₁₀ H ₁₀ O ₂	Diphenylmaleic anhydride.....	R.	Bi.	+		Small 55° (apprx.)	Ax. pl. a(100); Z||c	(G)	
	C ₁₀ H ₁₁ O ₂ Br	2, 3-Diphenyl-3-bromo-Δ ⁴ -crotono lactone.....	M.	Bi.				Ax. pl. ⊥b(010)	(G)	
	C ₁₀ H ₁₀ O ₂	Diphenylsuccinic anhydride.....	R.	Bi.			166° (Li) (apprx.)	Ax. pl. b(010); Z||a	(G)	
	C ₁₀ H ₁₁ N ₂	Di- <i>p</i> -dicyanobenzylamine.....	Tri.	Bi.		69° 39'		Ax. pl. ||c(001)	(G)	
	C ₁₀ H ₁₁ O ₄ N	α-B e n s o y l-β-acetylbenzoylhydroxylamine	M.	Bi.	+	75° 20'		Ax. pl. ⊥b(010)	(G)	
5066.1	C ₁₀ H ₁₁ N ₂	1, 5-Diphenyl-3-methyl pyrazole.....	M.	Bi.		68° 22'		Ax. pl. b(010); ZΛc = 7° in obtuse ∠β	(G)	
5067.1	C ₁₀ H ₁₁ O	Benzylidene- <i>p</i> -tolyl ketone.....	R.	Bi.	+	36° 4'	61° 7'	Ax. pl. c(001); Z||b	(G)	
	C ₁₀ H ₁₁ Cl ₃	Di- <i>p</i> -tolyltrichloroethane.....	M.	Bi.	+		85° 5'	Ax. pl. b(010); ZΛc = 4° in acute ∠β	(G)	
	C ₁₀ H ₁₁ O ₂ N	Ethyl benzohydroxamic benzoate.....	R.	Bi.	+		94° 55'	Ax. pl. a(100); Z||c	(G)	
	C ₁₀ H ₁₁ O ₂ N	<i>anti</i> -Benzoyl benzohydroxamic ethyl ether	Tri.	Bi.	-		18° 30' (apprx.)		(G)	
	C ₁₀ H ₁₁ O ₄ N	Anisoyl <i>p</i> -toluohydroxamic acid.....	M.	Bi.	+	63° 49'	113° 6'	Ax. pl. b(010); Z⊥c(001)	(G)	
	C ₁₀ H ₁₀ O ₄ N	<i>p</i> -Tolyl anisohydroxamic acid.....	M.	Bi.	+	50° 10'	82° 52'	Ax. pl. b(010); ZΛc = 49° in acute ∠β	(G)	
	C ₁₀ H ₁₁ ON ₂	Phenyl styryl ketone.....	R. (?)	Bi.					(12)	
5082.4	C ₁₀ H ₁₁ N ₂	Acetophenone methylphenylhydrazine..	M.	Bi.			Large	Ax. pl. b(010); Z⊥a(100)	(G)	
	C ₁₀ H ₁₁ O ₂ N ₂	Diacetylhydrazobenzene.....	R.	Bi.	-	88° 45'		Ax. pl. b(010); X||a	(G)	
	C ₁₀ H ₁₀ O ₄ N ₂	2-Phenyl-1-allylbisimidazolium sulfate..	M.	Bi.	+		56° 48'	Ax. pl. ⊥b(010); ZΛc = 33° 51' in obtuse ∠β	(G)	
	C ₁₀ H ₁₀ O ₂ N ₄	2, 3-Dinitro- <i>p</i> -xylene + 2, 6-dinitro- <i>p</i> -xylene	R.	Bi.	-		38° 36.5'	Ax. pl. a(100); X||c	(G)	
	C ₁₀ H ₁₁ O ₄ N.4H ₂ O	<i>l</i> -Benzoylecgonine tetrahydrate.....	R.	Bi.			45° (apprx.)	Ax. pl. a(100); Z||b	(G)	
5131	C ₁₀ H ₁₂ O ₂ NBr	Homatropine hydrobromide.....	R.	Bi.	-		69°-70°	Ax. pl. c(001); X||b	(G)	
	C ₁₀ H ₁₂ O ₂ N ₂	Antipyrine isovalerianate.....	M.	Bi.		68° (apprx.)		Ax. pl. c(001); ZΛc = 17° in obtuse ∠β	(G)	
5135.1	C ₁₀ H ₁₁ O ₄	Methyl santonate.....	R.	Bi.	-	74° 24' (red)	134° 12' (red)	Ax. pl. a(100); X||c	(G)	
	C ₁₀ H ₁₂ O ₄	Methyl metasantonate.....	M.	Bi.		90°		Ax. pl. ⊥b(010)	(G)	
	C ₁₀ H ₁₁ O ₄	Methyl parasantonate.....	R.	Bi.	-		58° 25' (red)	Ax. pl. a(100); X||c	(G)	
	C ₁₀ H ₁₂ O ₄ Br	β-Bromoacetyl tetraethylphloroglucinol..	M.	Bi.	+		50° (apprx.)	Ax. pl. ⊥b(010)	(G)	
5142.1	C ₁₀ H ₁₂ O ₄ N.H ₂ O	<i>l</i> -Phenyl-α'-methylpiperidine <i>d</i> -tartrate	R.	Bi.	-		55° 42'	Ax. pl. b(010); X||c	(G)	
	C ₁₀ H ₁₂ O	Guaiol (Champacool).....	Trig.	Un.					(G)	
	C ₁₀ H ₁₁ O ₄ N	Ethyl anisohydroxamic benzoate.....	M.	Bi.	+	71° 55'		Ax. pl. ⊥b(010); Z||b	(G)	
	C ₁₀ H ₁₁ O ₄ N	<i>syn</i> -Anisoylbenzohydroxamic ethyl ether	M.	Bi.	-		66° 13'	Ax. pl. ⊥b(010); XΛc = 55° 30' in acute ∠β	(G)	
	C ₁₀ H ₁₁ O ₄ N	<i>anti</i> -Benzoylanisohydroxamic ethyl ether	M.	Bi.	-		63° 7'	Ax. pl. ⊥b(010)	(G)	
5202	C ₁₀ H ₁₀ O ₂ N.H ₂ O	Morphine.....	R.	Bi.	-		125° (apprx.)	Ax. pl. ⊥ to elongation	(28)	
	C ₁₀ H ₁₂ NBr	α-Benzylphenylallylmethylammonium bromide	R.	Bi.		30°-40° (apprx.)		Ax. pl. c(001); Z||b	(G)	
	C ₁₀ H ₁₂ NCl	α-Benzylphenylallylmethylammonium chloride	R.	Bi.			100° (apprx.)	Ax. pl. c(001); Z||b	(G)	
	C ₁₀ H ₁₀ ON ₂	Oxymethylenecamphor phenylpyrazole.....	M.	Bi.	+		26° 40'	Ax. pl. ⊥b(010)	(G)	
	C ₁₀ H ₁₀ ON ₂	Pseudoephedrine phenylthiourea.....	R.	Bi.	+		76° 15'	Ax. pl. c(001); Z||b	(G)	
	C ₁₀ H ₁₀ ON ₂ S	Ephedrine phenylthiourea.....	R.	Bi.	+	66° 25'	89° 43'	Ax. pl. c(001); Z||a	(G)	
5213.1	C ₁₀ H ₁₀ O ₂	(<i>p</i> -Dianisyl)dimethylmethane.....	R.	Bi.	-	89° 54.5'			(G)	
5226	C ₁₀ H ₁₂ O ₄ NBr.3H ₂ O	Hyosine hydrobromide.....	R.	Bi.	-			101° 12'	Ax. pl. b(010); X||c	(G)
5228	C ₁₀ H ₁₂ O ₄ NCl	Cocaine hydrochloride.....	R.	Bi.	-		Large (> 120°)	Ax. pl. (010)	(27)	

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
	$C_{17}H_{23}O_2Br$	Ethyl <i>d</i> (1)-bromosantoniglate.....	R.	Bi.	+		123° 26'	Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{23}O_2N$	Menthyl- α -nitrobenzoate.....	R.	Bi.	-	30° 32'	47° 24'	Ax. pl. b(010); X||c	(G)
	$C_{17}H_{23}O_2N_2$	2-Keto-6-methyl 4-(<i>p</i> -isopropyl phenyl)- 1, 2, 3, 4-tetrahydropyrimidine-5-ethyl carboxylate.....	M.	Bi.	+	44° (apprx.)		Ax. pl. b(010)	(G)
	$C_{17}H_{23}ON_2$	α -Dipentene nitrolbenzylamine.....	M.	Bi.	+		108° 14'	Ax. pl. b(010); Z \wedge c = 18° in acute $\angle\beta$	(G)
	$C_{17}H_{23}ON_2$	<i>d</i> (1)-Pinene nitrolbenzylamine.....	R.	Bi.	+		89° 9'	Ax. pl. c(001); Z||a	(G)
	$C_{17}H_{23}O_2$	1, 1, 2-Trimethyl-2-phenylcyclopentane- 3-ethyl carboxylate.....	M.	Bi.	-	65° 20'		Ax. pl. b(010); X \wedge c = 50° in acute $\angle\beta$	(G)
5244	$C_{17}H_{23}O_2$	Menthyl benzoate.....	R.	Bi.			70° (apprx.)	Ax. pl. c(001); Z||b	(G)
5244.1	$C_{17}H_{23}O_4$	Ethyl santonate.....	R.	Bi.	+	64° 6' (red)		Ax. pl. a(100); Z||c	(G)
	$C_{17}H_{23}O_4$	Ethyl parasantonate.....	R.	Bi.	-		35° 35' (red)	Ax. pl. a(100); X||c	(G)
	$C_{17}H_{23}O_{10}$	Ethyl tetraacetylquininate.....	R.	Bi.	-	79° 58'		Ax. pl. a(100); X||c	(G)
	$C_{18}H_{19}O_{11}N_3S_2Bi \cdot 7H_2O$	Bismuth <i>m</i> -nitrobenzene sulfonate.....	M.	Bi.	+			Ax. pl. b(010); Z \wedge c = about 93° in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_5N_4$	γ -Benzoylpyridine picrate.....	M.	Bi.		62°		Ax. pl. \perp b(010); Z \wedge c = 65° in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_7N_4$	α -Benzylpyridine picrate.....	M.	Bi.		19°		Ax. pl. b(010)	(G)
	$C_{12}H_{15}O_7N_4$	γ -Benzylpyridine picrate.....	Tri.	Bi.		28°			(G)
	$C_{12}H_{15}O_4$	Diacetyl dihydroxy stilbene.....	M.	Bi.	-	81° 39'		Ax. pl. \perp b(010); X \wedge c = 13° in acute $\angle\beta$	(G)
5304	$C_{12}H_{15}O_7$	<i>d</i> (1)-Usnic acid.....	R.	Bi.	+			Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{15}O$	Diethylanthrone.....	R.	Bi.			60° (apprx.)	Ax. pl. c(001); Z||a	(G)
	$C_{12}H_{15}O_4$	Hydrobenzoin diacetate.....	M.	Bi.		85° (apprx.)		Ax. pl. b(010); Z \wedge c = 12° in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_4$	Isohydrobenzoin diacetate.....	R.	Bi.	-	80° 54'		Ax. pl. b(010); X||c	(G)
	$C_{12}H_{12}$	<i>sym</i> -Tetramethylantracene hydride....	R.	Bi.	-		79°-83°	Ax. pl. b(010) (blue); X||c	(G)
	$C_{12}H_{12}$	Tetramethyl- <i>p</i> -stilbene.....	M.	Bi.	+		24° (apprx.)	Ax. pl. b(010); Z \wedge c = 90° in obtuse $\angle\beta$	(G)
	$C_{12}H_{15}O_2$	Benzoyl- <i>p</i> -tert.-amyl phenol.....	R.	Bi.	-		58° 47'	Ax. pl. b(010); X||a	(G)
5317	$C_{12}H_{15}O_2N$	Codeine.....	R.	Bi.	+		125° (apprx.)		(29)
5317	$C_{12}H_{15}O_2N \cdot H_2O$	Codeine.....		Bi.	-		130° (apprx.)		(29)
5319	$C_{12}H_{15}O_2N$	Isocodeine.....	R.	Bi.	-			Ax. pl. b(010); X||c	(G)
5320	$O_{12}H_{15}O_2N$	Pseudocodeine.....	M.	Bi.	+			Ax. pl. \perp b(010); Z \wedge c = 22° in acute $\angle\beta$	(G)
	$C_{12}H_{15}O_2N_2$	Tetraethyl- <i>p</i> -diaminopyromellitate....	M.	Bi.		85°-90°		Ax. pl. b(010)	(G)
5336	$C_{12}H_{17}O_2N$	Capsaicin.....	Bi.						(28)
	$C_{12}H_{19}O_2N$	Hydrocapsaicin.....	Bi.						(28)
	$C_{12}H_{21}O_2N$	Vanillyl <i>n</i> -decoylamide.....	R.	Bi.	+		23° (calc.)		(24)
5343.1	$C_{12}H_{12}$	Fichtelite (Retene perhydride).....	M.	Bi.	-			Ax. pl. b(010); X||a-axis	(G)
	$C_{12}H_{17}O_{10} \cdot 2H_2O$	Melenitose.....	R.	Bi.	-		85°	X = a, Y = b, Z = c	(26)
	$C_{12}H_{11}O_4$	Methyl pulvinate.....	M.	Bi.	-			Ax. pl. b(010); X||c	(G)
	$C_{12}H_{15}O_4NS$	<i>ms</i> -Phenylacridonium hydrosulfate (green mod.).....	Tri.	Bi.	-	42°			(G)
	$C_{12}H_{15}O_4NS$	<i>ms</i> -Phenylacridonium hydrosulfate (red mod.).....	M.	Bi.	+			Ax. pl. b(010); Z \wedge c = 78° 30' in obtuse $\angle\beta$	(G)
5414	$C_{12}H_{17}N_3$	α -Triphenylguanidine.....	R.	Bi.	+		38° 3'	Ax. pl. c(001); Z||a	(G)
	$C_{12}H_{15}N_2I$	Phenyldiallylbensimidazolium iodide....	M.	Bi.	+	85° 40.5'		Ax. pl. \perp b(010); Z \wedge c = 38° 52' in obtuse $\angle\beta$	(G)
5424	$C_{12}H_{19}O_4N$	Bulbocapnine.....	R.	Bi.	-			Ax. pl. a(100); X||b	(G)
	$C_{12}H_{16}N_2$	Cinchene.....	R.	Bi.			100° 56'	Ax. pl. c(001); Z||b	(G)
	$C_{12}H_{19}ON_2$	Phenyldiallylbensimidazolium hydroxide	M.	Bi.	+		60° 21'	Ax. pl. b(010); Z \perp c(001)	(G)
5428.1	$C_{12}H_{19}ON_2$	Cinchoninone.....	R.	Bi.		65° 20'		Ax. pl. c(001); Z||b	(G)
	$C_{12}H_{21}N_2Cl \cdot 2H_2O$	Cinchonine chloride.....	R.	Bi.	+		13° (apprx.)	Ax. pl. a(100); Z||c	(G)
5441	$C_{12}H_{21}ON_2$	Cinchonidine.....	R.	Bi.	+		100° \pm 10°	Z = b	(40)
	$C_{12}H_{21}ON_2 \cdot C_6H_6$	Cinchonidine.....	R.	Bi.	+		Large		(40)
5442	$C_{12}H_{21}ON_2$	α -Cinchonine.....	M.	Bi.	-		38° \pm 2°		(40)
5442	$C_{12}H_{21}ON_2$	α -Cinchonine.....	M.	Bi.	-		35° 52'	Ax. pl. \perp b(010); X \wedge c = 57° in obtuse $\angle\beta$	(G)
	$C_{12}H_{22}O$	<i>d</i> -Cinnamalidene camphor.....	R.	Bi.	+		28° (apprx.)	Ax. pl. b(010); Z||a	(G)
	$C_{12}H_{22}ON_2Br \cdot H_2O$	Cinchonine hydrobromide.....	R.	Bi.			150°		(G)
	$C_{12}H_{22}ON_2Br \cdot C_2H_5O$	Cinchonine hydrobromide.....	R.	Bi.			155°		(G)
	$C_{12}H_{22}ON_2Br \cdot (?)H_2O$	Cinchonidine hydrobromide.....	R.	Bi.	+		140°	Ax. pl. a(100); Z||c	(G)
	$C_{12}H_{22}ON_2Cl \cdot 2H_2O$	Cinchonine hydrochloride.....	M.	Bi.	-		102°	Ax. pl. \perp b(010); X \wedge c = 35° in obtuse $\angle\beta$	(G)
	$C_{12}H_{22}ON_2Cl \cdot C_2H_5O$	Cinchonine hydrochloride.....	R.	Bi.	+		147°	Ax. pl. b(110); Z||c	(G)
	$C_{12}H_{22}ON_2I \cdot 1.5CH_3O$	Cinchonine hydroiodide.....	R.	Bi.	+		147° 40'	Ax. pl. c(001); Z||b	(29)
	$C_{12}H_{22}O_2N \cdot H_2O$	Codethyline.....	R.	Bi.	+		About 125°		(G)
	$C_{12}H_{24}O_2N_2S \cdot 5H_2O$	Cinchonidine sulfate.....	M.	Bi.	+		115° 36'	Ax. pl. \perp b(010); Z \wedge c = 59° in obtuse $\angle\beta$	(G)

Index No.	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
5818	$C_{22}H_{26}O_4$	Benzyl santolate.....	R.	Bi.	+	85° 57' (red)		Ax. pl. a(100); Z||c	(G)
	$C_{22}H_{26}ON_2 \cdot 2H_2O$	Cinchonidine ethiodide methiodide.....	R.	Bi.		73° 36'		Ax. pl. b(010); Z||a	(G)
	$C_{22}H_{26}O_4N_2$	Quinidine ethyl alcoholate.....	R.	Bi.			78° 30'	Ax. pl. b(010); Z||a	(G)
	$C_{22}H_{26}O_2S_2$	Menthyl thioxanthic anhydride.....	R.	Bi.	-	85° 6'		Ax. pl. b(010); X||a	(G)
	$C_{22}H_{26}ONBr$	Bromomethyltriphenyl pyrrolone.....	M.	Bi.	+	70° 15'	122° 55'	Ax. pl. \perp b(010); Z apprx. \perp s(101)	(G)
	$C_{22}H_{26}O_2N$	p-Toluy anisohydroxamic benzoate (α -mod.)	M.	Bi.	+	64° 32.5'	120° 38'	Ax. pl. \perp b(010); Z \wedge c = about 60° in obtuse $\angle\beta$	(G)
	$C_{22}H_{26}O_2N$	Anisoyl benzohydroxamic p-toluate (α -mod.)	M.	Bi.	+	78° 59'		Ax. pl. ||c(001); Z||a	(G)
	$C_{22}H_{26}O_2N$	Anisoyl p-toluhydroxamic benzoate.....	M.	Bi.	-	84° 55'		X||b	(G)
	$C_{22}H_{26}O_2N$	Benzoyl p-toluhydroxamic anisate.....	M.	Bi.	-	68° 32'	145°	Ax. pl. b(010); X \wedge c = 33° in obtuse $\angle\beta$	(G)
	$C_{22}H_{26}O_2N$	Benzoyl anisohydroxamic p-toluate.....	M.	Bi.	+	71° 12'		Ax. pl. b(010)	(G)
	$C_{22}H_{26}O_2N$	Benzoyl anisohydroxamic anisate.....	M.	Bi.			16° 42'	Ax. pl. \perp b(010); Z \wedge c = 53° 50' in obtuse $\angle\beta$	(G)
	$C_{22}H_{26}O_2N_2 \cdot H_2O$	Methylene bisantipyrine.....	M.	Bi.		76° 30'		Ax. pl. b(010); Z \wedge c = 56° in obtuse $\angle\beta$	(G)
	$C_{22}H_{26}O_2NI \cdot H_2O$	Methyl trimethylcolchidimethinate methiodide	R.	Bi.		72° (apprx.)		Ax. pl. a(100); Z||b	(G)
	$C_{24}H_{18}$	1, 3, 5-Triphenylbenzene.....	R.	Bi.	-	9° 30'	18° 25'	Ax. pl. b(010); X||c	(G)
	$C_{24}H_{18}ON$	Ethyltriphenylpyrrolone (β -mod.).....	M.	Bi.	-		17° 20'	Ax. pl. \perp b(010); X \wedge c = 63° in obtuse $\angle\beta$	(G)
	$C_{24}H_{18}ON$	Propyltriphenylpyrrolone (α -mod.).....	R.	Bi.	+	65° 50'	135° 30'	Ax. pl. a(100); Z||c	(G)
	$C_{24}H_{18}O_{10}$	Lepranthine.....	M.	Bi.				Ax. pl. b(010)	(G)
	$C_{24}H_{18}O$	Tetraphenylenepinacoline.....	M.	Bi.	-	80° (apprx.)		Ax. pl. b(010); X \wedge c = 50° (apprx.) in obtuse $\angle\beta$	(G)
	$C_{24}H_{22}O_2N$	d-Benzoylbulbocarpine.....	R.	Bi.	-	78° 34'	108° 58'	Ax. pl. c(001); X||b	(G)
	$C_{24}H_{22}O_2N_2$	Strychnine ethyl carbonate.....	?	Bi.	+		30°		(37)
	$C_{27}H_{34}O_4N_2$	Cinchonine phenylglycolate.....	R.	Bi.	+		(apprx.)	Ax. pl. b(010); Z||c	(G)
	$C_{27}H_{34}Br_2$	Cholestene dibromide (St. mod.)	R.	Bi.	+		45°	Ax. pl. a(100); Z||c	(G)
	$C_{28}H_{36}O_4$	Stilbeneglycol dibenzoate.....	M.	Bi.	+	85° 58'		Ax. pl. \perp b(010); Z||b	(G)
	$C_{28}H_{36}O_4N_2 \cdot 3H_2O$	Brucine valerianate.....	M.	Bi.			86° (apprx.)	Ax. pl. \perp b(010)	(G)
5961	$C_{30}H_{40}O_2$	Gurjum resin.....	Tri.	Bi.	-	86° 6'			(G)
	$C_{30}H_{40}O_2$	Cholesteryl formate.....	M.	Bi.	+			Ax. pl. b(010); Z \wedge c = 21° 30'	(G)
	$C_{30}H_{30}O_4N_2S_2$	α -Naphthylamine naphthalene-1, 5-disulfonate		Bi.					(1)
	$C_{30}H_{30}O_4N_2S_2$	α -Naphthylamine naphthalene-1, 6-disulfonate	M.	Bi.	-		Large		(1)
	$C_{30}H_{30}O_4N_2S_2$	α -Naphthylamide naphthalene-2, 6-disulfonate		Bi.	-		Large		(1)
	$C_{30}H_{30}O_4N_2S_2$	α -Naphthylamine naphthalene-2, 7-disulfonate		Bi.	+				(1)
	$C_{30}H_{30}O_4N_2S_2$	β -Naphthylamine naphthalene-1, 5-disulfonate (normal salt).		Bi.	+		75° 5' (obs.) 77° 6' (calc.)		(1)
	$C_{30}H_{30}O_4N_2S_2$	β -Naphthylamine naphthalene-1, 5-disulfonate (acid salt)		Bi.			Large		(1)
	$C_{30}H_{30}O_4N_2S_2$	β -Naphthylamine naphthalene-1, 6-disulfonate		Bi.	-		Large		(1)
	$C_{30}H_{30}O_4N_2S_2$	β -Naphthylamine naphthalene-2, 6-disulfonate		Bi.	+		70° 5'		(1)
	$C_{30}H_{30}O_4N_2S_2$	β -Naphthylamine naphthalene-2, 7-disulfonate		Bi.	-		Large	BzO \perp plates	(1)
	$C_{30}H_{32}$	d- α -Amyrilene.....	R.	Bi.	+	72° 12'		Ax. pl. c(001); Z||a	(G)
	$C_{30}H_{32}$	d- β -Amyrilene.....	R.	Bi.	+	22° 21.5'	35° 26.5'	Ax. pl. c(001); Z||b	(G)
	$C_{32}H_{34}O$	α -Isodynopinacoline.....	R.	Bi.	+			Ax. pl. a(100); Z||c	(G)
	$C_{32}H_{34}$	Tetraphenylethanebenzene.....	M.	Bi.			60° (apprx.) 26° (apprx.)	Ax. pl. \perp b(010)	(G)
	$C_{32}H_{34}O_2$	Dynopinacone.....	M.	Bi.			33° (apprx.)		(G)
	$C_{32}H_{34}O_{11}$	Tetrarin.....	Tri.	Bi.	-		69° 37' (red)	Ax. pl. \perp a(100)	(G)
6062.1	$C_{34}H_{40}O_{10}N_2S_2 \cdot 7H_2O$	Morphine sulfate.....	R.	Bi.	-		56° 10'	Ax. pl. b(010); X||a	(G)
6067	$C_{36}H_{52}O_{11}N$	Aconitine.....	R.	Bi.	+			Ax. pl. b(010); Z||a	(G)
6075	$C_{36}H_{52}O_2$	Cholesterol benzoate.....	Tet.	Un.			77° 40'		(G)
	$C_{36}H_{52}O_7N_2Se$	Cinchonine selenate ethyl alcoholate.....	M.	Bi.			60° 57'	Ax. pl. \perp b(010); Z \wedge c = 80° in obtuse $\angle\beta$	(G)
	$C_{36}H_{52}O_4N_2S_2 \cdot 3.5H_2O$	Amarine sulfate.....	M.	Bi.	+			Ax. pl. \perp b(010); Z \wedge c = 34° in acute $\angle\beta$	(G)
	$C_{36}H_{52}O_4N_2Se \cdot 5H_2O$	Strychnine selenate.....	M.	Bi.	+		14°		(G)
	$C_{36}H_{52}O_4N_2S_2 \cdot 5H_2O$	Strychnine sulfate.....	M.	Bi.	+		16° 30'	Ax. pl. \perp b(010); Z \wedge c = 32° 43' in obtuse $\angle\beta$	(G)
	$C_{38}H_{40}O_4$	Zeorine.....	H.	Un.					(G)

LITERATURE

(For a key to the periodicals see end of volume)

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Extensive data are given in Fedorow, "Das Krystallreich. Tabellen zur krystallochemischen Analyse," 1920; this is vol. 36 of *Mémoires de l'Académie des Sciences de Russie* (VIII series).

X-RAY DIFFRACTION DATA FROM CRYSTALS AND LIQUIDS

R. W. G. WYCKOFF

Introduction.—To find a given substance, consult Table A for all elementary substances, B for all chemical compounds, D for all alloys which are not definite chemical compounds, E for all liquids, and F for solid solutions of salts.

Except for the spacing observations given in Tables C' and E, there are recorded below only such observations as can be made to yield dimensions for at least a possible unit cell. The structure types of some of the simpler unit cells are shown in Figs. 1-11. The mode of designating these structures and other coordinate groups giving atomic positions is that described in Wyckoff, "The Structure of Crystals," Chemical Catalog Co., New York, 1924.

ABBREVIATIONS

2a, 4b, 8f, (4b, 4c), (4b, 4d), (32b, 48c), etc. refer to the correspondingly numbered coordinate groups in Wyckoff, l.c. and *Analytical Expression of the Results of the Theory of Space Groups* (Washington, 1922).

- a_0, b_0, c_0 Edge length of unit cell along the a -, b -, and c -crystallographic axes, respectively.
- α The angle between the three equivalent axes of a rhombohedral unit; in a triclinic crystal, the angle between the b - and c -axes.
- B.-c. Body-centered type of structure. The cubic B.-c. arrangement (2a) is shown in Fig. 1.
- β Angle between the a - and c -axes.
- C.-p. The hexagonal close-packed type of atomic arrangement (d) (see Fig. 3).
- γ Angle between the a - and b -axes in a triclinic crystal.
- 2Ci Holohedral symmetry class, monoclinic system. 2Ci- m (C_{2h}^m) as under T.
- 3Ci Second sort hexagonal tetartohedral symmetry class, rhombohedral division, hexagonal system. 3Ci- m (C_{3i}^m) and 3Ci- m (n) as under T.
- 4C Tetartohedral symmetry class, tetragonal system. 4C- m (C_4^m) as under T.
- 6Ci Paramorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6Ci- m (C_{6h}^m) as under T.
- Dia. Diamond type (8f.) of atomic arrangement (see Fig. 4).
- 2D Enantiomorphic hemihedral symmetry class, orthorhombic (rhombic) system. 2D- m (V^m), as under T.
- 2Di Holohedral symmetry class, orthorhombic system. 2Di- m (V_h^m) and 2Di- m (n) as under T.
- 3D Enantiomorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3D- m (D_3^m) and 3D- m (n) as under T.

- 3Di Holohedral symmetry class, rhombohedral division, hexagonal system. 3Di- m (D_{3d}^m) and 3Di- m (n) as under T.
- 4d Second sort hemihedral symmetry class, tetragonal system. 4d- m (V_d^m) and 4d- m (n) as under T.
- 4D Enantiomorphic hemihedral symmetry class, tetragonal system. 4D- m (D_4^m) as under T.
- 4Di Holohedral symmetry class, tetragonal system. 4Di- m (D_{4h}^m) and 4Di- m (n) as under T.
- 6Di Holohedral symmetry class, hexagonal division, hexagonal system. 6Di- m (D_{6h}^m) and 6Di- m (n) as under T.
- 2e Hemimorphic hemihedral symmetry class, orthorhombic system. 2e- m (C_{2v}^m) as under T.
- 3e Hemimorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3e- m (C_{3v}^m) and 3e- m (n) as under T.
- 6e Hemimorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6e- m (C_{6v}^m) and 6e- m (n) as under T.
- F.-c. Face-centered type of structure. Cubic F.-c. arrangement (4b) shown in Fig. 2.
- Oi Holohedral symmetry class, cubic system. Oi- m (O_h^m) and Oi- m (n) as under T.
- P. S. Possible structure. Used to designate those atomic arrangements which may be correct but for which additional results are needed or desirable.
- P. U. C. Possible unit cell. Used to designate those crystals for which the selected unit cells may be correct but which require additional experimental or theoretical treatment.
- S. P. Sample compressed.
- T Tetartohedral symmetry class, cubic system. T- $m = m^{th}$ space group having this symmetry ($= T^m$). T- m (n) = n^{th} atomic arrangement under T- m . For instance T-3(c) is seen by reference to Wyckoff (*Analytical expression*, p. 122), to be arrangement 8a. Similarly 4Di-7 (c) is the coordinate pair $0\frac{1}{2}u$; $\frac{1}{2}0u$ (*ibid.*, p. 93).
- Te Hemimorphic hemihedral (tetrahedral) symmetry class, cubic system. Te- m (T_d^m) and Te- m (n) as under T.
- Ti Paramorphic hemihedral (pyritohedral) symmetry class, cubic system. Ti- m (T_h^m) and Ti- m (n) have meanings analogous to those of similar symbols under T.
- $u, \text{ or } v$ Variable x, y or z parameter.

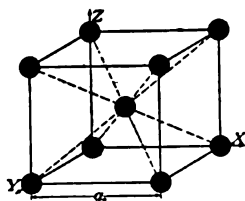


FIG. 1.—The unit cube of the body-centered cubic arrangement (2a). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{2}\frac{1}{2}\frac{1}{2}$.

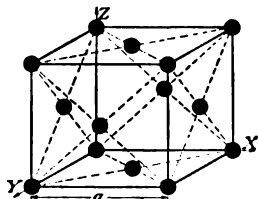


FIG. 2.—The unit cube of the face-centered cubic arrangement (4b). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{2}\frac{1}{2}0$; $\frac{1}{2}0\frac{1}{2}$; $0\frac{1}{2}\frac{1}{2}$.

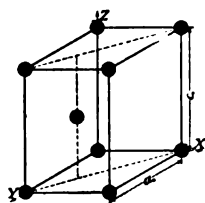


FIG. 3.—The unit cell of the hexagonal close-packed arrangement (d). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{3}\frac{2}{3}\frac{1}{2}$.

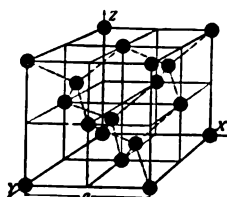


FIG. 4.—The unit cube of the diamond cubic arrangement (8f). The coordinates of the atomic positions associated with this cell are 000; $\frac{1}{4}\frac{1}{4}0$; $\frac{1}{4}0\frac{1}{4}$; $0\frac{1}{4}\frac{1}{4}$; $\frac{3}{4}\frac{3}{4}\frac{1}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{1}{4}\frac{1}{4}\frac{3}{4}$.

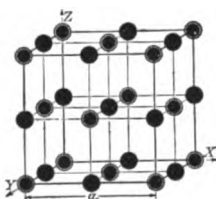


FIG. 5.—The unit cube of the NaCl-arrangement (4b, 4c). The atoms in positions 4b are shown as annuli; those in 4c as black circles. The coordinates of 4c are $0\frac{1}{2}0$; $\frac{1}{2}00$; $00\frac{1}{2}$; $\frac{1}{2}\frac{1}{2}\frac{1}{2}$.

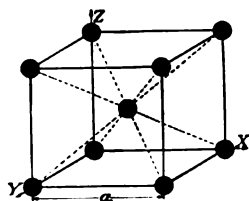


FIG. 6.—The unit cube of the CsCl-arrangement (1a, 1b). Atoms of one sort, in 1a, are shown as annuli; the other kind of atom, in 1b, appears as a black circle.

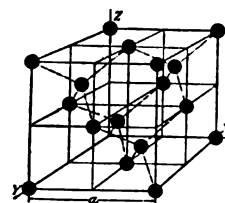


FIG. 7.—The unit cube of the ZnS-arrangement (4b, 4d). The atoms in position 4d appear as black circles; their coordinates are $\frac{1}{4}\frac{3}{4}\frac{1}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{1}{4}$.

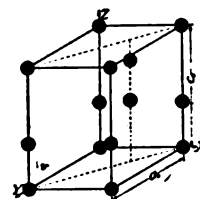


FIG. 8.—The unit cell of the ZnO-arrangement (e'). The coordinates of equivalent atomic positions are 000; $\frac{2}{3}\frac{1}{3}\frac{1}{2}$ and $00v$; $\frac{2}{3}\frac{1}{3}v + \frac{1}{2}$.

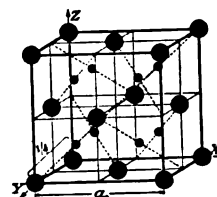


FIG. 9.—The unit cell of the CaF₂-arrangement (4b, 8c). The atoms in positions 8c, shown as black circles, have the coordinates $\frac{1}{4}\frac{1}{4}\frac{1}{4}$; $\frac{1}{4}\frac{3}{4}\frac{3}{4}$; $\frac{3}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{3}{4}\frac{1}{4}$; $\frac{1}{4}\frac{1}{4}\frac{3}{4}$; $\frac{3}{4}\frac{3}{4}\frac{3}{4}$; $\frac{1}{4}\frac{3}{4}\frac{1}{4}$; $\frac{1}{4}\frac{1}{4}\frac{1}{4}$.

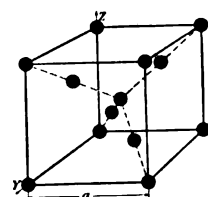


FIG. 10.—The unit cube of the Cu₂O-arrangement (2a, 4d). The atoms in positions 4d are shown as annuli, those in 2a appear as black circles.

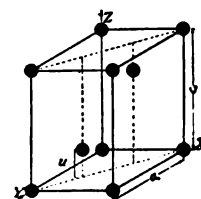


FIG. 11.—The unit cell of the hexagonal Mn(OH)₂-arrangement (h). The coordinates of the equivalent atomic positions in the unit are 000 and $\frac{1}{3}\frac{2}{3}u$; $\frac{2}{3}\frac{1}{3}u$.

A-TABLE.—ELEMENTS

Chemical symbol	Crystal system	Structure type	Space group	Unit cell		Molecules	Calculated density	Lit. and remarks
				Size, Å				
				a_0	c_0			
A	C.	F.-c.(4b)		5.43		4	1.645	(227) (temp. ca. -253°)
Ag	C.	F.-c.(4b)		4.079		4	10.49	(82, 142, 165, 218, 235, 240, 241, 265, 329, 371)
Al	C.	F.-c.(4b)		4.043		4	2.692	(84, 127, 128, 141, 197, 206, 216, 241, 329, 366, 361)
As	H.	3Di-5(c)	3Di-5	4.142; 54° 7'		2	5.75	(43, 366) u. = 0.226, probably correct
Au	C.	F.-c.(4b)		4.064		4	19.4	(82, 84, 142, 165, 218, 241, 329, 371)
Be	H.	C.-p.(d)	6Di-4?	2.283	3.607	2	1.828	(163)
Bi*	H.	3Di-5(c)	3Di-5	4.726; 57° 16'		2	9.86	(82, 118, 139, 140, 142, 166, 193)
C-dia.	C.	Dia.(8f)	Oi-7	3.56		8	3.51	(52, 59, 60, 128)
Graph.†	H.	6e-4(a, b)	6e-4?	2.46	6.79	4	2.22	(14, 88, 89, 105, 119, 128, 262, 310)
Ca	C.	F.-c.(4b)		5.56		4	1.538	(134, 135)
Cd	H.	C.-p.(d)	6Di-4?	2.98	5.63	2	8.56	(134, 136, 229)
Ce	C.	F.-c.(4b)		5.12		4	6.90	(137)
	H.	C.-p.(d)	6Di-4?	3.65	5.96	2	6.73	(137). Existence (?) (224)
Co	C.	F.-c.(4b)		3.554		4	8.67	(131, 136), cf. (224)
	H.	C.-p.(d)	6Di-4?	2.514	4.105	2	8.66	(131, 136), cf. (224)
Cr	C.	B.-c.(2a)		2.875		2	7.22	(131, 136, 201, 206)
Cu	C.	F.-c.(4b)		3.603		4	8.95	(46, 82, 84, 141, 145, 196, 197, 198, 199, 200, 329, 374, 371)
Fe- α	C.	B.-c.(2a)		2.855		2	7.92	(82, 84, 122, 128, 131, 168, 196, 250, 253, 254, 255, 256, 362)
Fe- β	C.	B.-c.(2a)		2.90 at 800°		2	7.55	No structural inversion, α to β (250, 253, 254, 255, 256, 257)
Fe- γ	C.	F.-c.(4b)		{ 3.63 at 1100° 3.68 at 1425°		4	{ 7.70 at 1100° 7.40 at 1425°	
Fe- δ	C.	B.-c.(2a)		2.93 at 1425°		2	7.33	
Ga			Symmetry said to be not cubic					
Ge	C.	Dia.(8f)	Oi-7	5.62		8	5.38	(14, 138)
Hf	H.	C.-p.(d)	6Di-4?	3.32	5.46	2	11.8	(324, 379)
Hg		Two different structures have been deduced						
In	Tet.?	?		4.58	4.86	4	7.43	(134, 136) P. U. C.
Ir	C.	F.-c.(4b)		3.823		4	22.8	(134, 136, 284)
K	C.	B.-c.(2a)		5.20 at -150°		2	0.917 at -150°	(162). Approximate only
Li	C.	B.-c.(2a)		3.50		2	0.534	(32, 33, 128)
Mg	H.	C.-p.(d)	6Di-4?	3.22	5.23	2	1.709	(36, 128, 129, 196)
Mn (α)	C.?			8.89		56?	7.21	(350) P. U. C.
Mn (β)	C.?			6.289		20?	7.29	(350) P. U. C.
Mn (γ)	Tet.?			3.774	3.533	4	7.21	(350, 368) P. U. C.
Mo	C.	B.-c.(2a)		3.143		2	10.20	(82, 136, 236, 329)
Na	C.	B.-c.(2a)		4.30		2	0.954	(128)
Nb	C.?			4.19		4		(366) P. U. C. Impure
Ni	C.	F.-c.(4b)		3.499		4	9.04	(36, 82, 84, 128, 131, 136, 168, 206, 260, 299, 329, 360, 361)
Os	H.	C.-p.(d)		2.714	4.32	2	22.8	(137)
P (black)	H.			5.96; 60° 16'		8		(392) P. S. like As
Pb	C.	F.-c.(4b)		4.920		4	11.48	(82, 84, 156, 196, 206, 241, 329, 340)
Pd	C.	F.-c.(4b)		3.859		4	12.25	(134, 136, 164, 167, 329, 393)
Pt	C.	F.-c.(4b)		3.913		4	21.5	(82, 134, 136, 142, 329, 393)
Rh	C.	F.-c.(4b)		3.820		4	12.2	(136, 393)
Ru	H.	C.-p.(d)	6Di-4?	2.686	4.272	2	12.6	(134, 136)
S	R.		2Di-24	10.61	24.56	128	2.02	(61, 314) $b_0 = 12.87$
Sb	H.	3Di-5(c)	3Di-5	4.500; 56° 37'		2	6.73	(140, 193) u. = 0.231
Se	H.	3D-4(a)	3D-4 or	4.34	4.95	3	4.86	(42, 232, 308, 366) u. = 0.216.
		(or 3D-6(a))	3D-6					P. S.
Si	C.	Dia.(8f)	Oi-7	5.42		8	2.32	(88, 107, 108, 127, 128, 153, 154)
Sn (gray)	C.	Dia.(8f)	Oi-7	6.46		8	5.81	(29, 30, 31), cf. (206)
(white)	Tet.	4Di-19(a)	4Di-19?	5.824	3.165	4	7.30	(29, 30, 31, 172, 173, 174, 206, 238)
Ta	C.	B.-c.(2a)		3.272		2	17.1	(25, 134, 136)

Chemical symbol	Crystal system	Structure type	Space group	Unit cell			Calculated density	Lit. and remarks
				Size Å		Molecules		
				a_0	c_0			
Te	H.	3D-4(<i>a</i>) or 3D-6(<i>a</i>)	3D-4 or 3D-6	4.44	5.90	3	6.26	(42, 232, 308, 366) $u = 0.269$. P. S.
Th	C.	F.-c.(4 <i>b</i>)		5.04		4	12.0	
Ti	H.	C.-p.(<i>d</i>)	6Di-4?	2.92	4.67	2	4.58	
Tl	H.?	C.-p.(<i>d</i>)?	6Di-4(?)	3.47	5.52	2	11.7	
U	Tet.(?)			4.75	5.40			
V	C.	B.-c.(2 <i>a</i>)		Said to be not cubic			5.98	(25)
W	C.	B.-c.(2 <i>a</i>)		3.04		2	19.8	(138)
Zn	H.	C.-p.(<i>d</i>)	6Di-4?	3.155		2	7.04	(67, 82, 84, 87, 136, 374)
Zr	H.	C.-p.(<i>d</i>)	6Di-4?	2.657	4.948	2	7.04	(134, 136, 206, 229, 346)
				3.23	5.14	2	6.47	(137, 379)

* $u = 0.237$. (142, 61 early editions) give incorrect structures.

† u for 6c-4 (a) = 0. u for 6c-4 (b) = $\frac{1}{4}$.

B-TABLE.—STANDARD ARRANGEMENT *v.* p. 96

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
H ₂ O	H.			4.52	7.32	4	0.918	(54, 90, 114, 210, 213)	P. U. C. Atomic arrangement not yet known with certainty.
HCl	C.	F.-c.?		5.50; -168°C		4	1.45	(228)	
11 N ₂ O	C.	(4f)	T-4	5.77		4	1.61	(232, 288)	$u_0 = 0.22$, distance O-N = 1.06 Å. P. S.
NH ₃	C.	[4f, T-4(b)]	T-4	5.19 (ca. -80°)		4	0.81	(238)	$u = 0.22$
NH ₄ Cl (high)	C.	NaCl-like		6.53(250°)		4	1.27	(20)	
NH ₄ Cl (low)	C.	CaCl ₂ -like		3.86		1	1.528	(20, 120, 244, 280)	
N ₂ H ₅ Cl ₂	C.	FeS ₂ -like (8A, 8A)	Ti-6	7.89		4	1.41	(281)	$u_N = \text{ca. } 0.04$, $u_{Cl} = 0.27$
NH ₄ Br (high)	C.	NaCl-like		6.90(250°)		4	1.97	(20)	
NH ₄ Br (low)	C.	CaCl ₂ -like		4.047		1	2.438	(20, 120, 244)	
NH ₄ I	C.	NaCl-like		7.244		4	2.517	(20, 120, 242)	
(NH ₄) ₂ SO ₄	R.		2Di-16	5.95	7.73	4	1.80	(188)	$b_0 = 10.5$
12 PH ₃	Tet.	4Di-7(a, c)	4Di-7	6.34	4.62	2	2.88	(94)	$u_1 = 0.40 \pm 0.01$
(NH ₄)H ₂ PO ₄	Tet.		4d-12	7.48	7.55	4	1.80	(342)	N atoms at 4d-12(a); P at 4d-12(b)
As ₂ O ₃	C.	(32b, 48c)	Oi-7	11.06		16	3.86	(41)	$u_{As} = 0.89$, $v_0 = 0.21$
Sb ₂ O ₃	C.	(32b, 48c)	Oi-7	11.14		16	5.57	(41)	$u_{Sb} = 0.88$, $v_0 = 0.23$
16 CO ₂	C.	(4b, 8A)	Ti-6	5.62		4	1.64	(217, 218, 288, 282)	u_0 uncertain. Liquid air-temperature

For other carbon compounds belonging here *v.* the C-Table *infra*

SiO ₂ (β -quartz)	H.	6D-4 } (c, j) 6D-5	6D-4 & 6D-5	5.01	5.47	3	2.50	(231, 232, 280)	$u = 0.197$
SiO ₂ (low quartz)	H.		3D-3 & 3D-5 or 3D-4 & 3D-6	4.903	5.398	3	2.648	(21, 46, 169, 227, 321)	P. U. C. a_0 -spacing for quartz very accurately determined.
SiO ₂ (β -cristobalite)	C.	(8f, 16b)	Oi-7 ?	7.12(290°)		8	2.20	(288, 277, 280)	
(NH ₄) ₂ SiF ₆	C.	(4b, 8a, 24a)	Oi-5	8.38		4	2.00	(28)	$u_F = 0.205$
SiC, I	H.			3.098	37.9	15	3.15	(282)	Complex structure assigned
SiC, II	H.		6C-6 ?	3.098	15.17	6	3.15	(247, 248)	C at 6C-6(a) if $u = 0$ and 6C-6(b), if $u = \frac{1}{2}$ and $\frac{1}{2}$. Si at 6C-6(a) if $u' = \frac{1}{2}$ and 6C-6(b) if $u' = 0.29$ and 0.95 P. S.
SiC, III	H.			3.098	10.10	4	3.16	(290)	C at 000; 004; $\frac{1}{2} \frac{1}{2} \frac{1}{2}$; $\frac{1}{2} \frac{1}{2} \frac{1}{2}$. Si at 00u; 0, 0, $u + \frac{1}{2}$; $\frac{1}{2}$, $\frac{1}{2}$, $u + \frac{1}{2}$; $\frac{1}{2}$, $\frac{1}{2}$, $u + \frac{1}{2}$, $u = \text{ca. } \frac{1}{16}$. P. S.
TiO ₂ (rutile)	Tet.	4Di-14(a, f)	4Di-14	4.58	2.98	2	4.21	(83, 112, 241, 263)	
TiO ₂ (anatase)	Tet.			5.27	9.37	8	4.05	(242)	P. U. C.
Ti ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.37; 56° 48'		2	4.67	(261)	
TiN	C.	NaCl(4b, 4c)		4.237		4	5.407	(12, 306)	The later determination gives $a_0 = 4.40$
TiC	C.	NaCl(4b, 4c)		4.297		4	5.017	(12, 306)	The later determination gives $a_0 = 4.60$
21 ZrO ₂	C.	CaF ₂ (4b, 8e)	Oi-5	5.08		4	6.19	(12)	P. S. Other data (52) conflict. 2 modifications?
ZrS ₂	H.	Mn(OH) ₂ (h)	3Di-3	3.68	5.85	1	3.73	(12)	P. S. $u = \text{ca. } 0.25$
ZrSe ₂	H.	Mn(OH) ₂ (h)	3Di-3	3.79	6.18	1	5.38	(12)	P. S. $u = \text{ca. } 0.25$
ZrN	C.	NaCl(4b, 4c)		4.61		4	7.1	(12, 306)	P. S.
(NH ₄) ₂ ZrF ₇	C.	(4d, 4e, 12a, 24u)	Oi-4	9.35		4	2.28	(12)	$0.15 < u_N < 0.21$; $0.42 < u_F < 0.48$; $0.23 < v_F < 0.28$
ZrC	C.	NaCl(4b, 4c)		4.78		4	6.4	(12, 306)	P. S.
ZrSiO ₄	Tet.			9.20	5.87	8	4.85	(241)	P. U. C.

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
SnO	Tet.	4Di-7(a, c)?		3.77	4.77	2	6.56	(300)	
SnO ₂	Tet.	4Di-7(a, c)		4.72	3.16	2	7.07	(83, 241, 263)	P. U. C.
SnI ₄	C.	Ti-6(c, d)	Ti-6	12.28		8	4.52	(96, 175)	$u_{\text{Sn}} = 0.129$, $u_{\text{I}} = 0.258$, $z = 0.009$, $y = 0.001$, $z = 0.258$
(NH ₄) ₂ SnCl ₆	C.	(4b, 8e, 24a)	Oi-5	10.05		4	2.39	(92)	$u_{\text{Cl}} = 0.245$ and < 0.25
23 PbO	Tet.	4Di-7(a, c)		3.99	5.01	2	9.23	(97, 300)	$u_{\text{Pb}}[4\text{Di-7(c)}] = 0.24$
PbO ₂	Tet.	4Di-14(a, f)	4Di-14	4.97	3.40	2	9.40	(345, 386)	
PbF ₂ (β)	C.	CaF ₂ (4b, 8e)	Oi-5	5.93		4	7.76	(340)	
PbS	C.	NaCl(4b, 4c)		5.97		4	7.42	(61, 76, 154, 340, 357)	
PbSe	C.	NaCl(4b, 4c)		6.14		4	8.17	(357, 366)	
PbTe	C.	NaCl(4b, 4c)		6.34		4	8.67	(357)	
Pb(NO ₃) ₂	C.	(4b, 8h, Ti-6(24))	Ti-6	7.84		4	4.54	(191, 245)	
TbO ₂	C.	CaF ₂ (4b, 8e)	Oi-5	5.59		4	9.98	(13, 83, 111)	Another determination of a_0 (289) varies widely from this.
Ga ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.281; 55° 35'		2	6.62	(351)	
In ₂ O ₃	C.		Oi-10	10.12		16	7.07	(351)	
(Ga, In) ₂ O ₃	C.		Oi-10	9.76		16		(351)	39 mol. % In ₂ O ₃
Ti ₂ O ₃	C.		Oi-10	10.57		16	10.2	(351)	
TiCl	C.	CsCl(1a, 1b)	Oi-1	3.84		1	6.93	(85, 239, 369)	
TiBr	C.	CsCl(1a, 1b)	Oi-1	3.97		1	7.44	(239, 369)	
ZnO	H.	ZnO(e')	6e-4	3.25	5.23	2	5.61	(4, 7, 51, 61, 121, 249)	
Zn(BrO ₃) ₂ ·6H ₂ O	C.	(4b, 8h, Ti-6(24))	Ti-6	10.31		4	2.59	(278)	
α-ZnS (wurtzite)	H.	ZnO(e')	6e-4	3.84	6.28	2	4.01	(9, 51, 381)	$u_{\text{S}} = ca. \frac{1}{2}$
β-ZnS (blende)	C.	ZnS(4b, 4d)	Te-2	5.43		4	4.02	(47, 103, 108, 154)	
ZnSe	C.	ZnS(4b, 4d)	Te-2	5.65		4	5.29	(80)	
ZnCO ₃	H.	3Di-6(a, b, e)	3Di-6	5.62; 48° 23'		2	4.54	(160)	
29 CdO	C.	NaCl(4b, 4c)		4.72		4	8.06	(86, 217)	
CdF ₂	C.	CaF ₂ (4b, 8e)	Oi-5	5.40		4	6.30	(340)	
CdI ₂	H.	Mn(OH) ₂ (h)	3Di-3	4.24	6.84	1	5.67	(39)	0.23 < $u_{\text{I}} < 0.253$
α-CdS	H.	ZnO(e')	6e-4	4.14	6.72	2	4.78	(51, 381)	$u_{\text{S}} = ca. \frac{1}{2}$
β-CdS	C.	ZnS(4b, 4d)	Te-2	5.82		4	4.84	(381)	
Hg ₂ Cl ₂	Tet.	4Di-17(e)		4.47	10.89	2	7.16	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{Cl}} = \frac{1}{2}$. P. S.
Hg ₂ Br ₂	Tet.	4Di-17(e)		4.65	11.10	2	7.71	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{Br}} = \frac{1}{2}$. P. S.
HgI ₂	Tet.			4.356	12.34	2	6.40	(397)	
Hg ₂ I ₂	Tet.	4Di-17(e)		4.92	11.61	2	7.68	(344)	$u_{\text{Hg}} = \frac{1}{2}$, $u_{\text{I}} = \frac{1}{2}$. P. S.
HgS (metacinnabarite)	C.	ZnS(4b, 4d)	Te-2	5.84		4	7.71	(150, 151, 154, 336, 337, 365, 366)	
HgS (cinnabar)	H.		3D-4 & 3D-6	4.16	9.54	3	8.12	(180, 357, 365, 366)	P. S. suggested
CuO	Tri.			3.74	4.67	4	6.48	(188)	P. S. This suggested structure resembles NaCl. $b_0 = c_0$. $\alpha = 85^\circ 21'$; $\beta = 86^\circ 25'$; $\gamma = 93^\circ 35'$
Cu ₂ O	C.	Cu ₂ O(2a, 4d)	Oi-4	4.28		2	6.02	(61, 113, 188)	
CuCl	C.	ZnS(4b, 4d)	Te-2	5.40		4	4.15	(76, 293)	
CuBr	C.	ZnS(4b, 4d)	Te-2	5.75		4	4.98	(76, 293)	
CuI	C.	ZnS(4b, 4d)	Te-2	6.07		4	5.62	(8, 76, 293)	
Cu ₂ Se	C.	CaF ₂ (4b, 8e)	Oi-5	5.75		4	7.16	(80)	
Cu ₂ Zn ₃	C.			4.01				(24) cf. (197)	Correctness in doubt
32 Ag ₂ O	C.	Cu ₂ O(2a, 4d)	Oi-4	4.72		2	7.27	(76, 88, 161, 277)	
AgCl	C.	NaCl(4b, 4c)		5.54		4	5.56	(76, 264, 265)	
AgBr	C.	NaCl(4b, 4c)		5.77		4	6.45	(76, 264, 265)	
AgI	H.	ZnO(e')	6e-4	4.59	7.50	2	5.66	(6, 8, 265)	
AgI	C.	ZnS(4b, 4d)	Te-2	6.49		4	5.67	(76, 264, 265)	
Ag ₃ PO ₄	C.	(2a, 6f, 8a)	Te-4	6.00		2	6.37	(287)	
Ag ₃ AsO ₄	C.	(2a, 6f, 8a)	Te-4	6.12		2	6.66	(287)	
(4AgI:CuI) miersite	C.	ZnS(4b, 4d)	Te-2	6.35		4		(8)	A solid solution of AgI and CuI. Exact composition unknown
(NH ₄) ₂ PtCl ₆	C.	(4b, 8e, 24a)	Oi-5	9.84		4	3.08	(292)	0.22 < $u_{\text{Cl}} < 0.24$
PtAs ₂ (sperryite)	C.	FeS ₂ (4b, 8h)	Ti-6	5.94		4		(357)	Composition unknown
(NH ₄) ₂ PdCl ₄	Tet.	4Di-1(a, e, j)	4Di-1	7.21	4.26	1	2.12	(95)	$u_{\text{Cl}} = 0.23$
MnO	C.	NaCl(4b, 4c)		4.40		4	5.50	(157)	
MnO ₂	Tet.			4.44	2.89	2	5.04	(214)	Pyrolusite gives the same pattern as polianite
Mn(OH) ₂	H.	Mn(OH) ₂ (h)	3Di-3	3.34	4.68	1		(3)	Dimensions of this unit calculated from the density $\rho = 3.26$. $u_0 = ca. 0.22$
MnS	C.	NaCl(4b, 4c)		5.21		4	4.06	(272)	
MnS ₂	C.	FeS ₂ (4b, 8h)	Ti-6	6.15		4		(104, 106)	$u_{\text{S}} = 0.40$. Size of unit cell calculated from the best available density, [$\rho = 3.38(182)$]
MnCO ₃	H.	3Di-6(a, b, e)	3Di-6	5.84; 47° 45'		2	3.79	(47, 270)	C atoms at (a); $u_0 = 0.27$
43 FeO	C.	NaCl(4b, 4c)		4.294		4	5.99	(322)	
Fe ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.42; 55° 17'		2	5.25	(61, 81, 181, 205, 351)	$u_{\text{Fe}} = 0.105 \pm 0.001$; $u_0 = 0.292 \pm 0.007$
Fe ₃ O ₄	C.	(8f, 16c, 32b)	Oi-7	8.37		8	5.21	(50, 121, 189, 394)	$u_0 = ca. 0.37$
FeS (troilite)	H.	6e-4(a, b)		3.43	5.79	2	4.90	(356, 391)	If $u_{\text{Fe}} = 0$, $u_{\text{S}} = ca. \frac{1}{2}$. If $u = \frac{1}{2}$ exactly, the space group is 6Di-4

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
FeS ₂ (pyrite)	C.	FeS ₂ (4b, 8a)	Ti-6	5.38		4	5.08	(47, 104, 106, 387)	$u_s = 0.38s$
FeS + S ₈	H.	6c-4(a, b)		3.43	5.68	2		(286, 391)	Artificial and natural pyrrhotites containing excess sulfur
FeSe	H.	6c-4(a, b)		3.61	5.87	2		(386)	39.4% Fe (weight)
FeSe + Se ₈	H.	6c-4(a, b)		3.51	5.55	2		(286)	35.0% Fe (weight)
Fe(S, Se)	H.	6c-4(a, b)		3.54	5.91	2		(286)	49.8% (weight) Fe, 12.0% S, 38.2% Se
(NH ₄) ₂ FeF ₆	C.	(4b, 4c, 8e, 24a)	Oi-5	9.10		4	1.96	(202)	N atoms at (4c) and (8e). 0.187 < u_F < 0.217, best around 0.21
NH ₄ Fe(SO ₄) ₂ ·12H ₂ O	C.	(4b, 4c, 8a, 8a, Ti-6 (24))	Ti-6	12.14		4	1.81	(246)	
Fe ₂ C	R.			4.52	6.74	4	7.67	(5, 6, 7, 284, 261)	Cementite and cohenite are identical in structure. Atomic arrangement unknown. $b_0 = 5.07$
FeCO ₃	H.	3Di-6(a, b, c)	3Di-6	5.82; 47° 45'		2	3.86	(47, 276)	C atoms at (a); $u_0 = 0.27$ probably
FeSi	C.			4.48		4	6.16	(207)	Probably tetartohedral; atomic arrangement unknown
FeSi ₂	Tet.			2.69	5.08	1	5.02	(207)	P. U. C., structure unknown
FeCuS ₂	Tet.	4d-5(c, a, g)?	4d-5 ?	5.23	5.15	2		(66, 116)	Fe atoms at (c). $u_0 = ca. 0.21$. Probably correct structure.
CoO	C.	NaCl(4b, 4c)		4.24		4	6.49	(281)	
CoS	H.	6c-4(a, b)		3.37	5.14	2	5.94	(286)	
CoAsS	C.	FeS ₂ -like(4f)	T-4	5.65		4	6.07	(183, 287)	Reflection microscopic results (161) suggest that this structure may not be correct
(Fe, Co)S (synthetic)	H.	6c-4(a, b)		3.36	5.29	2		(286)	Composition = ca. 50 atomic % FeS
45 NiO	C.	NaCl(4b, 4c)		4.172		4	6.78	(74, 56, 299, 251, 252, 260)	
NiS (synthetic)	H.	6c-4(a, b)		3.42	5.30	2	5.58	(286)	$u_s = ca. \frac{1}{2}$ taking $u_{Ni} = 0$
NiS (millerite)	H.	3c-5(b, b)	3c-5	5.64; 116° 36'		3		(286)	Possible atomic positions are suggested
Ni ₂ S ₂	C.?			4.08		1		(286)	P. U. C.
NiSe	H.	6c-4(a, b)		3.66	5.33	2		(286)	
Ni(NO ₃) ₂ ·6NH ₃	C.	(4b, 8a, Ti-6(24))	Ti-6	10.96		4	1.43	(275)	u_N in (8a) = $ca. \frac{1}{2}$. u_N and $s_N = ca. 0$, s_0 and $v_0 = ca. \frac{1}{2}$.
NiCl ₂ ·6NH ₃	C.	(4b, 8e, 24a)	Oi-5	10.09		4	1.49	(274)	$u_N = 0.24$
NiBr ₂ ·6NH ₃	C.	(4b, 8e, 24a)	Oi-5	10.48		4	1.84	(274)	
NiI ₂ ·6NH ₃	C.	(4b, 8e, 24a)	Oi-5	11.01		4	2.05	(274)	$u_N = 0.24$
NiAs	H.	6c-4(a, b)		3.61	5.03	2		(9, 286, 391)	Nicolite from Eisleben.
NiAsS (gersdorffite)	C.	FeS ₂ -like(4f)	T-4	5.68		4		(287, 286)	
NiSb	H.	6c-4(a, b)		3.92	5.11	2	8.78	(286, 391)	For the mineral breithauptite from Andreasberg $a_0 = 3.90$, $c_0 = 5.09$
NiSbS (ullmanite)	C.	FeS ₂ -like(4f)	T-4	5.91		4		(287)	Composition unknown
(Ni, Fe)S (synthetic)	H.	6c-4(a, b)		3.408	5.540	2		(286)	S = 37.8%, Fe = 33.9%, Ni = 28.3% (weight)
(Ni, Fe)S (synthetic)	H.	6c-4(a, b)		3.408	5.434	2		(286)	S = 38.4%, Fe = 28.7%, Ni = 32.8% (weight)
(Ni, Fe)S (pentlandite)	C.		Oi-5 ?	10.00		32		(286)	(8i, 24a, 32a) with u_{Fe} (24a) = $ca. \frac{1}{2}$ and $u_s = ca. \frac{1}{2}$ gives fair agreement. Various compositions
Cr ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.38; 54° 58'		2	5.28	(281)	
MoS ₂	H.	6Di-4(c, f)	6Di-4	3.15	12.30	2	5.00	(99, 311)	$u_s = 0.62_1$
(NH ₄) ₂ MoO ₄ F ₂	C.	(4b, 4c, 8e, 24a)	Oi-5 ?	9.10		4	2.23	(203)	N atoms at (4c) and (8e). F + O at (24a). $0.194 < u_{F,O} < 0.220$
PbMoO ₄	Tet.			3.85	6.02	1		(91)	P. U. C.
Ag ₂ MoO ₄	C.	(8f, 16c, 32b)	Oi-7	9.26		8	6.28	(276)	$0.34 < u_0 < 0.40$
49 UO ₂	C.	CaF ₂ (4b, 8e)	Oi-5	5.47		4	10.89	(13, 111)	
UO ₂ (NO ₃) ₂ ·6H ₂ O	R.		2Di-17	13.15	11.42	4	2.75	(68, 204)	U atoms probably at 2Di-17 (c) with $u = 0.13$. $b_0 = 8.02$
V ₂ O ₅	H.	3Di-6(c, e)	3Di-6	5.43; 53° 53'		2	5.09	(281)	
VN	C.	NaCl(4b, 4c)		4.28		4	5.47	(206)	
VC	C.	NaCl(4b, 4c)		4.30		4	5.23	(206)	
CbN	C.	NaCl(4b, 4c)		4.41		4	8.28	(206)	
CbC	C.	NaCl(4b, 4c)		4.40		4	8.14	(206)	
TaN	H.	ZnO(c)	6c-4	3.05	4.94	2	16.2	(13)	P. S. Cf. (287) which gives conflicting results
TaC	C.	NaCl(4b, 4c)		4.59		4	13.7	(13, 206)	
B ₂ H ₄	H.			4.54	8.69	2	0.589	(249)	B atoms probably at 6Di-4 (f) with $u = ca. 0.10$. Temperature not stated
55 Al ₂ O ₃	H.	3Di-6(c, e)	3Di-6	5.12; 55° 17'		2	3.96	(61, 81, 181, 205, 251)	The α -form. $u_{Al} = 0.105 \pm 0.001$; $u_0 = 0.303 \pm 0.003$

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a ₀	c ₀				
AlN	H.	ZnO(c')	6c-4	3.11	4.98	2	3.24	(198)	$u = 0.38 \pm 0.01$
(NH ₄) ₂ AlF ₆	C.	(4b, 4c, 8a, 24a)	Oi-5	8.40		4	2.17	(202)	N atoms at (4c) and (8a). $0.194 < u_F < 0.200$
NH ₄ Al(SO ₄) ₂ ·12H ₂ O	C.	(4b, 4c, 8a, 8a, Ti-6 (24))	Ti-6	12.0e		4	1.76	(248, 282)	
AlSb	C.	ZnS(4b, 4d)	Te-2	6.13		4	4.26	(286)	
Al ₂ Fe(SiO ₄) topas	R.		2Di-16	4.64	8.37	4		(188)	Topas from San Luis Potosi, Mexico; $b_0 = 8.78$
CuAl	H.	F.-c.?		3.89; 94° 36'		4		(141, 197, 288)	This structure may be incorrect
Cu ₂ Al	C.	F.-c.		3.47		4		(24) cf. (141)	Probably incorrect
CuAl ₂	Tet.	B.-c.		6.05	4.88	4	4.35	(141, 197, 288)	Atomic arrangement unknown
(Fe ²⁺ , Mn ²⁺) ₃ Al ₂ (SiO ₄) ₃ (garnet)	C.		Oi-10	11.40		8		(190)	67 atomic % of ferrous iron
NiAl	C.	CaCl(1a, 1b)?		2.82		1	6.28	(24)	More work needed
56 Sc ₂ O ₃	C.		Oi-10	9.79		16	3.89	(281)	
ScN	C.	NaCl(4b, 4c)		4.44		4	4.4e	(306)	
(Sc, In) ₂ O ₃	C.		Oi-10	9.90		16		(281)	66.8 mol. % Sc ₂ O ₃
(Al, Sc) ₂ O ₃	C.		Oi-10	9.22		16		(281)	Composition unknown
Y ₂ O ₃	C.		Oi-10	10.56		16	5.07	(281)	
YtPO ₄	Tet.			9.60	5.94	8	4.44	(242)	P. U. C.
(Yt, Ti) ₂ O ₃	C.		Oi-10	10.53		16		(281)	50 weight % Y ₂ O ₃
(Yt, Bi) ₂ O ₃	C.		Oi-10	10.72		16		(281)	37.4 mol % Bi ₂ O ₃
La ₂ O ₃	H.			3.948	6.151	1	6.48	(281)	
Ce ₂ O ₃	C.	CaF ₂ (4b, 8a)	Oi-5	5.41		4	7.18	(82, 111)	
Ce ₂ O ₃	H.			3.88e	6.057	1	6.8e	(281)	
60 Pr ₂ O ₃	H.			3.851	5.99e	1	7.07	(281)	
Pr ₂ O ₁₁	C.			10.98		?		(282)	P. U. C.
Nd ₂ O ₃	H.			3.841	6.00e	1	7.28	(281)	
Sm ₂ O ₃	C.		Oi 10	10.85		16	7.21	(281)	
Eu ₂ O ₃	C.		Oi-10	10.84		16	7.2e	(281)	
Gd ₂ O ₃	C.		Oi-10	10.79		16	7.6e	(281)	
66 Tb ₂ O ₃	C.		Oi-10	10.70		16	7.9e	(281)	
Tb ₂ O ₇ ?	C.			10.55		?		(282)	P. U. C. "Brown terbium oxide"
Dys ₂ O ₃	C.		Oi-10	10.63		16	8.2e	(281)	
Ho ₂ O ₃	C.		Oi-10	10.58		16	8.3e	(281)	
Er ₂ O ₃	C.		Oi-10	10.54		16	8.64	(281)	
Tm ₂ O ₃	C.		Oi-10	10.52		16	8.77	(281)	
Yb ₂ O ₃	C.		Oi-10	10.39		16	9.3e	(281)	
Lu ₂ O ₃	C.		Oi-10	10.37		16	9.4e	(281)	
(NH ₄) ₂ HfF ₇	C.	(4d, 4e, 12a, 24a)	Oi-4	9.40		4		(117)	Contains 15% (NH ₄) ₂ ZrF ₇
75 BeO	H.	ZnO(c')	6c-4	2.70	4.39	2	2.98	(109, 162, 222, 244)	w_0 ca. 4.
Be ₂ O(C ₂ H ₃ O ₂) ₂	C.			15.7e		8	1.38	(88, 62)	A possible atomic arrangement suggested
Be ₂ O(C ₂ H ₃ O ₂) ₂	M.			16.0e	9.1e	2	1.26	(62)	P. U. C. $b_0 = 9.7a$, $\beta = 116^\circ 7'$
MgO	C.	NaCl(4b, 4c)		4.20e		4	3.59	(66, 107, 109, 110, 121, 122, 222, 271, 287)	
Mg(OH) ₂	H.	Mn(OH) ₂ (h)	3Di-3	3.11	4.73	1	2.43	(2, 8, 169)	
MgF ₂	Tet.	4Di-14(a, f)	4Di-14	4.66	3.08	2	3.11	(228, 248, 267)	$u_F = 0.30$
MgS	C.	NaCl(4b, 4c)		5.08		4	2.84	(128)	
MgCO ₃	H.	3Di-6(a, b, e)	3Di-6	5.61; 48° 12'		2	3.10	(160)	
Mg ₂ Si	C.	CaF ₂ (4b, 8a)	Oi-5	6.39		4	1.94	(290)	
Mg ₂ Sn	C.	CaF ₂ (4b, 8a)	Oi-5	6.78		4	3.54	(202, 270)	
Mg ₂ Pb	C.			6.75		4	5.47	(270)	
(Mg, Fe ²⁺) ₂ SiO ₄ olivine	R.		2Di-5	4.77	6.00	4		(28, 212)	Structure probably CaF ₂ (4b, 8a)
Al ₂ Mg ₄	C.			4.80			2.62	(24)	14 atomic % of ferrous iron.
Mg ₂ Al ₂ O ₄	C.	(8f, 16c, 32b)	Oi-7	8.07		8		(50, 189)	$b_0 = 10.28$
77 CaO	C.	NaCl(4b, 4c)		4.79		4	3.37	(79, 86, 107, 109)	More work needed
Ca(OH) ₂	H.	Mn(OH) ₂ (h)	3Di-3	3.52	4.93	1	2.31	(180)	$w_0 = 0.37$. Value of a_0 calculated from the best available density ($\rho = 3.57$)
CaF ₂	C.	CaF ₂ (4b, 8a)	Oi-5	5.46		4	3.17	(47, 76, 107, 108)	
CaS	C.	NaCl(4b, 4c)		5.68		4	2.60	(79, 125)	
CaSO ₄	R.		2Di-17	6.21	6.96	4		(226)	Anhydrite, not analyzed. $b_0 = 6.95$
Ca ₂ SO ₄ ·6H ₂ O	Tri.							(18)	Some unreduced measurements have been recorded for this salt
CaSe	C.	NaCl(4b, 4c)		5.91		4	3.81	(79)	
Ca(NO ₃) ₂	C.	(4b, 8a, Ti-6(24))	Ti-6	7.60		4	2.47	(246)	
Ca(F, Cl)Ca ₄ (PO ₄) ₂ apatite	H.		6Ci-2	9.41	6.88	2		(122)	Composition unknown
CaCO ₃ (calcite)	H.	3Di-6 (a, b, e)	3Di-6	6.36; 46° 6'		2		(47, 49, 179, 221, 270)	C atoms at (a). $w_0 = 0.25$. A wave length standard
CaCO ₃ (aragonite)	R.	2Di-16(c, c, c, d)?	2Di-16	4.94	5.72	4	2.94	(58, 280)	A possible atomic arrangement has been suggested. $b_0 = 7.94$
Ca(HCOO) ₂	R.		2Di-5 ?	10.16	6.20	8	2.08	(222)	P. U. C.
CaTiO ₃	C.?			7.68		8		(243)	P. U. C. (?) More work necessary
CaWO ₄	Tet.			3.64	6.64	1		(91)	P. U. C.

Chemical symbol	Crystal system	Structure	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
CaMg(CO ₃) ₂ (dolomite)	H.	3Ci-2(a, b, c, f)	3Ci-2	6.02; 47° 7'		1	2.84	(61, 289, 313)	
CaMg(SiO ₃) ₂ (diopside)	M.		2Ci-6	9.71	5.24	4	3.28	(291)	$b_0 = 8.89; \beta = 74^\circ 10'$
Ca(Mg, Fe)(CO ₃) ₂	H.	3Ci-2(a, b, c, f)	3Ci-2	6.02; 47° 7'		1		(289)	30 atomic % of ferrous iron
78 SrO	C.	NaCl(4b, 4c)		5.10		4	5.15	(107, 109)	
SrF ₂	C.	CaF ₂ (4b, 8e)	Oi-5	5.86		4	4.12	(13)	
SrCl ₂	C.	CaF ₂ (4b, 8e)	Oi-5	7.00		4	3.05	(341)	
SrS	C.	NaCl(4b, 4c)		5.87		4	3.90	(125)	
SrSe	C.	NaCl(4b, 4c)		6.23		4	4.55	(230, 231, 308)	
Sr(NO ₃) ₂	C.	(4b, 8h, Ti-6(24))	Ti-6	7.81		4	2.93	(191, 245)	
BaO	C.	NaCl(4b, 4c)		5.50		4	6.08	(107, 109)	
BaF ₂	C.	CaF ₂ (4b, 8e)	Oi-5	6.20		4	4.86	(76)	
BaS	C.	NaCl(4b, 4c)		6.35		4	4.37	(125)	
BaSO ₄	R.		2Di-16	8.898	7.170	4	4.432	(1, 290, 326, 327, 334, 335)	$b_0 = 5.448$
BaSe	C.	NaCl(4b, 4c)		6.62		4	4.93	(231, 308)	
Ba(NO ₃) ₂	C.	(4b, 8h, Ti-6(24))	Ti-6	8.11		4	3.23	(191, 245)	Approx. atomic positions are said to be u_N, x_0 and $y_0 = ca. \frac{1}{2}$, $z_0 = ca. 0$
81 Li ₂ O	C.	CaF ₂ (4b, 8e)	Oi-5	4.61		4	2.01	(35)	
LiH	C.	NaCl(4b, 4c)		4.10		4	0.76	(34)	
LiF	C.	NaCl(4b, 4c)		4.01		4	2.65	(78, 88, 132, 367)	
LiCl	C.	NaCl(4b, 4c)		5.14		4	2.06	(78, 194, 219)	
LiBr	C.	NaCl(4b, 4c)		5.49		4	3.46	(78, 194, 219)	
LiI	C.	NaCl(4b, 4c)		6.00		4	4.09	(78, 194, 219, 294)	
Li ₂ S	C.	CaF ₂ (4b, 8e)	Oi-5	5.70		4	1.64	(339)	
Li ₂ C ₂ O ₄	R?			6.58	6.61	4	2.15	(25)	$b_0 = 7.74$. P. U. C.
LiCHO ₂	M?			7.61	4.87	4	1.53	(25)	$b_0 = 6.03; \beta = 95^\circ 42'$. P. U. C., S. P.
LiC ₂ H ₃ O ₂	R?			12.80	7.43	12	1.17	(25)	$b_0 = 11.6a$. P. U. C., S. P.
LiC ₂ H ₅ O ₂	R?			16.98	9.45	16	1.08	(25)	$b_0 = 12.15$. P. U. C., S. P.
LiC ₄ H ₉ O ₂ crotonate	H?			24.8	10.7	48	1.27	(25)	P. U. C., S. P.
LiC ₄ H ₇ O ₂ butyrate	H?			27.7	10.1	48	1.07	(25)	P. U. C., S. P.
LiC ₄ H ₇ O ₂ isobutyrate	Tet?			19.75	9.25	24	1.01	(25)	P. U. C., S. P.
LiC ₄ H ₉ O ₂ valerate	Tet?			24.5	9.4	32	1.01	(25)	P. U. C., S. P.
LiC ₅ H ₉ O ₂ isovalerate	R?			11.70	6.93	4	1.00	(25)	$b_0 = 8.70$. P. U. C., S. P.
LiC ₅ H ₉ O ₂ trimethylacetate	C?			18.56		36	1.00	(25)	P. U. C., S. P.
LiC ₇ H ₁₃ O ₂ heptylate	Tet?			27.4	9.3	32	1.02	(25)	P. U. C., S. P.
LiC ₈ H ₁₅ O ₂ caprylate	H?			42.1	10.9	72	1.05	(25)	P. U. C., S. P.
LiC ₈ H ₁₇ O ₂ nonylate	Tet?			36.6	9.3	48	1.04	(25)	P. U. C., S. P.
LiC ₁₁ H ₁₉ O ₂ undecylate	H?			52.6	9.5	72	0.99	(25)	P. U. C., S. P.
LiC ₁₁ H ₂₁ O ₂ undecylate	Tet?			41.8	9.2	48	0.94	(25)	P. U. C., S. P.
LiC ₁₂ H ₂₃ O ₂ laurate	Tet?			28.3	11.7	24	0.87	(25)	P. U. C., S. P.
LiC ₁₃ H ₂₅ O ₂ oleate	H?			64.6	9.5	72	0.99	(25)	P. U. C., S. P.
LiC ₁₅ H ₃₁ O ₂ stearate	H?			62.5	9.8	72	1.04	(25)	P. U. C.
82 NaF	C.	NaCl(4b, 4c)		4.62		4	2.81	(75, 78, 209)	
NaHF ₂	H.	3Di-5(a, b, c)?	3Di-5	5.17; 39° 44'		1	2.01	(211)	Na at (a); $u_F = 0.42$. P. S.
NaCl	C.	NaCl(4b, 4c)		5.628		4		(44, 45, 47)	One of the fundamental wave length standards
NaClO ₃	C.	(4f, 4f, T-4(12))	T-4	6.56		4	2.49	(98, 143, 144, 147, 148, 149, 246, 247, 266)	$u_{Na} = ca. 0.06$; $u_{Cl} = ca. 0.41$. Different positions have been suggested for the O atoms
NaBr	C.	NaCl(4b, 4c)		5.94		4	3.24	(75, 78, 273)	
NaBrO ₃	C.	(4f, 4f, T-4(12))	T-4	6.71		4	3.30	(98, 143, 148, 149, 163, 246, 247)	$u_{Na} = ca. 0.09$, $u_{Br} = ca. 0.41$. Different positions have been suggested for the O atoms
NaI	C.	NaCl(4b, 4c)		6.46		4	3.67	(75, 78, 273)	
Na ₂ S	C.	CaF ₂ (4b, 8e)	Oi-5	6.53		4	1.85	(339)	
NaN ₃	H.	3Di-5(a, b, c)	3Di-5	5.481; 38° 43'		1	1.838	(396)	$u = 0.423$
NaNO ₃	H.	3Di-6(a, b, e)	3Di-6	6.32; 48° 6'		2	2.19	(47, 267)	N atoms at (a). $u_0 = 0.25$
NaH(C ₂ H ₃ O ₂) ₂	C.		Ti-7?	15.98		24	1.38	(279)	
NaC ₂ H ₃ O ₂ v. Table C'.									
NaCd ₂	C.							(202)	Apparently very complicated
NaSb(AlO ₃) ₂	H.	6Di-4(a or b, d, f, etc.)	6Di-4	5.40	8.81	2		(10)	$u_{Al} < 0.10$; O positions not known
83 KF	C.	NaCl(4b, 4c)		5.33		4	2.53	(75, 78, 132, 273)	
KHF ₂	Tet.	4Di-18(a, h)	4Di-18	5.67	6.81	4	2.35	(40)	$u_F = 0.14 \pm 0.01$. The H atoms may have arrangement 4Di-18(d)
KCl	C.	NaCl(4b, 4c)		6.280		4	1.987	(44, 75, 78, 120)	
KBr	C.	NaCl(4b, 4c)		6.578		4	2.760	(44, 75, 120, 273)	
KI	C.	NaCl(4b, 4c)		7.052		4	3.124	(69, 70, 71, 75, 78, 120, 132, 273, 283, 366)	
KI ₃	M.			9.36		4		(69, 70, 71)	P. U. C. b_0 and c_0 approx. = a_0 , and β approx. = 90° .
K ₂ SO ₄	R.		2Di-16	5.73	7.42	4	2.70	(192, 276)	$b_0 = 10.01$
KN ₃	Tet.	4Di-18(a, d, h)	4Di-18	6.094	7.056	4	2.045	(396)	$u = 0.135$
KH ₂ PO ₄	Tet.		4d-12	7.40	6.96	4	2.36	(342)	K atoms at 4d-12(a); P at 4d-12(b)
KCN	C.	NaCl-like		6.55		4	1.53	(37, 72, 73)	

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
KCNO	Tet.			6.07 ₀	7.03 ₀	4	2.06 ₅	(396)	Structure similar to KN ₃ $b_0 = 15.74$
KH ₂ C ₄ O ₄ Cl (H chloromaleate)	R.		2D-16(?)	7.62	10.95	8		(398)	
KC ₂ H ₃ O ₃ s. Table C'.									
K ₂ SnCl ₆	C.	(4b, 8a, 24a)	Oi-5	9.96		4	2.74	(92)	$u_{Cl} = 0.345$ and < 0.25
K ₂ Zn(CN) ₄	C.	(8f, 16c, 32b)	Oi-7	12.54		8	1.66	(92)	$u_C = ca. 0.34$, $u_N = ca. 0.40$; $\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ Cd(CN) ₄	C.	(8f, 16c, 32b)	Oi-7	12.84		8	1.84	(92)	$\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ Hg(CN) ₄	C.	(8f, 16c, 32b)	Oi-7	12.78		8	2.43	(92)	$\frac{1}{2}(u_C + u_N) = 0.37$
K ₂ PtCl ₆	Tet.	4Di-1(a, c, f)	4Di-1	6.99	4.13	1	3.40	(98)	$0.233 < u_{Cl} < 0.238$
K ₂ PtCl ₆	C.	(4b, 8a, 24a)	Oi-5	9.7		4	3.5	(219, 220)	Assigned value, $u_{Cl} = 0.16$, probably incorrect
K ₂ PdCl ₆	Tet.	4Di-1(a, c, f)	4Di-1	7.04	4.10	1	2.65	(98)	$u_{Cl} = 0.23$
KCr(SO ₄) ₂ ·12H ₂ O	C.	(4b, 4c, 8a, 8a, Ti-6 (24))	Ti-6	11.9 ₈		4	1.97	(246)	
KAl(SO ₄) ₂ ·12H ₂ O	C.	(4b, 4c, 8a, 8a, Ti-6 (24))	Ti-6	12.0 ₈		4	1.81	(186, 237, 248, 282)	
KAlSi ₃ O ₈ (adularia)	M.		2Ci-3	8.57	7.23	4		(214)	$b_0 = 13.01$, $\beta = 116^\circ 7'$ Composition unknown
KLiSO ₄	H.		6C-6?	5.13	8.60	2	2.39	(220)	P. U. C. An atomic arrangement is suggested
84 RbF	C.?	CeCl(1a, 1b)?		3.66?		1?		(78, 209, 294)	Structure probably incorrect
RbCl	C.	NaCl(4b, 4c)		6.57 ₁		4	2.81 ₂	(78, 102, 272, 286)	
RbBr	C.	NaCl(4b, 4c)		6.86 ₈		4	3.36 ₉	(74, 75, 126)	
RbI	C.	NaCl(4b, 4c)		7.32 ₅		4	3.56 ₆	(77, 78, 120, 273)	
Rb ₂ SO ₄	R.		2Di-16	5.95	7.78	4	3.66	(182)	$b_0 = 10.38$
CsF	C.	NaCl(4b, 4c)		6.01		4	4.6 ₃	(78, 209)	
CsCl	C.	CeCl(1a, 1b)	Oi-1	4.11 ₀		1	3.99 ₀	(78, 65, 120)	
CsBr	C.	CeCl(1a, 1b)	Oi-1	4.29		1	4.45	(77, 78, 272)	
CsI	C.	CeCl(1a, 1b)	Oi-1	4.56 ₂		1	4.514	(69, 70, 71, 75, 76, 273)	
Cs ₂	R.			6.82	11.0 ₁	4	4.51	(177, 178, 179, 225)	$b_0 = 9.95$
Cs ₂ I	H.	3Di-5(a, b, c)	3Di-5	5.46; 70° 42'		1	3.88	(288)	I probably at (b); $u_{Cl} = 0.31$
CsBr ₂ I	R.		2Di-16	6.57	10.66	4	4.29	(177, 178, 179, 225)	$b_0 = 9.18$
Cs ₂ SO ₄	R.		2Di-16	6.22	8.20	4	4.30	(192)	$b_0 = 10.88$
Tourmaline	H.		3e-1	16.2 ₈	7.2 ₆			(182)	P. U. C. Composition unknown
			3e-2						
R'AlSi ₃ O ₈ and R''AlSi ₃ O ₈	Tri. and M.							(116)	Unreduced powder- and Lane-photographs have been prepared from various feldspars

C-TABLE.—THE C-ARRANGEMENT. See also TABLE C' *infra*

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			a_0	b_0	c_0				
CH ₃ N ₂ O	Urea.....	Tet.	5.63		4.7 ₀	2	1.33	(25, 175)	Space group 4d-3
C ₂ H ₂ O ₄	Oxalic acid.....	R.	6.46	7.79	6.02	4	1.96	(215)	Space group 2Di-15
C ₂ H ₆	Ethane.....	H.	4.46		8.19	2	0.70 ₂	(249)	C atoms probably at 6Di-4(f) with $u = ca. 0.10$. Temperature not stated.
C ₂ H ₅ N ₃ O	N-Methylurea.....	R.	5.63	5.64	4.70	4?		(171)	Space group 2D-4?
C ₂ H ₇ NO	Acetaldehyde ammonia.....	H.	8.18; $\alpha = 84^\circ 50'$			6		(171, 216)	Space group 3Di-5?
C ₂ H ₂ O ₄	Oxalic acid dihydrate.....	M.	6.05	3.57	11.9	2	1.68	(215)	Space group 2Ci-5. $\beta = 106^\circ 12'$
C ₂ H ₅ N ₃ O	1, 2-Dimethylurea.....	R.	4.53	10.9	5.14	2		(171)	Space group 2e-7?
C ₂ H ₂ O ₃	Maleic anhydride.....	R.	6.58	11.4 ₈	5.90	4	1.44	(25)	P. U. C., S. P.
C ₂ H ₂ O ₄	Acetylenedicarboxylic acid.....	M?	7.88	9.04	6.62	4	1.70	(25)	$\beta = 111^\circ 6'$. P. U. C., S. P.
C ₂ H ₄ NIO ₃	Iodosuccinimide.....	Tet.	6.29		15.5 ₈	4	2.41	(285)	P. U. C. Space group 4C-2 and 4C-4?
C ₄ H ₄ O ₃	Succinic anhydride.....	R.	6.95	11.64	5.41	4	1.51	(290)	P. U. C., cf. (25)
C ₄ H ₄ O ₄	Maleic acid.....	M.	7.49	10.14	7.12	4	1.46	(25, 299)	$\beta = 117^\circ 7'$. Space group 2Ci-5(?)
C ₄ H ₄ NO ₂	Succinimide.....	R.	7.50	9.60	12.75	8	1.42	(290)	P. U. C. Space group 2Di-1?
C ₄ H ₄ O ₄	Fumaric acid.....	T.	7.56	15.00	6.20	6		(299)	$\alpha = 90^\circ 40'$, $\beta = 88^\circ 30'$, $\gamma = 89^\circ 48'$
C ₄ H ₄ O ₄	Succinic acid.....	M.	5.07	8.92	5.53	2		(290)	$\beta = 91^\circ 20'$. P. U. C., cf. (25)
C ₄ H ₄ O ₃	dl-Tartaric acid.....	Tri.	14.8 ₂	9.74	4.99	4		(17)	$\alpha = 82^\circ 20'$, $\beta = 122^\circ 56'$, $\gamma = 111^\circ 52'$. P. U. C.
C ₄ H ₄ O ₃	d-Tartaric acid.....	M.	7.70	6.04	6.20	2	1.76	(16)	$\beta = 100^\circ 17'$, cf. (25)
C ₄ H ₈ N ₄ O ₁₂	Pentaerythritol tetranitrate.....	Tet.	13.2		6.66	4	1.80	(262)	Space group 4Di-7
C ₄ H ₁₀ O ₄	Pentaerythritol.....	Tet.	6.16		8.76	2		(25, 176, 295)	Space group 4e-9
C ₄ H ₄ N ₂ O ₄	o-Dinitrobenzene.....	M.	7.95	13.0	7.45	4		(55)	$\beta = 112^\circ 7'$. P. U. C.
C ₄ H ₄ O ₂	Quinone.....	M.	11.4 ₀	6.43	6.85	4	1.40	(25)	$\beta = 93^\circ 20'$. P. U. C., S. P.
C ₆ H ₆	Benzene.....	R.	9.76	7.39	6.85	4	1.04	(64, 101, 278)	P. U. C., measurements at -20°C
C ₆ H ₆ O ₂	Resorcinol.....	R.	9.56	10.2 ₈	5.64	4		(53, 55)	P. U. C., cf. (25)
C ₆ H ₆ O ₂	Hydroquinol.....	M.	13.5 ₈	5.22	8.13	4		(53)	$\beta = 107^\circ$. P. U. C.
		H.	10.9 ₂		7.55	6	1.39	(25)	P. U. C., Latter S. P.
(C ₆ H ₁₀ O ₅) _x	Cellulose and starch.....							(124, 224)	Powder photographs have been obtained and possible units have been suggested.

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			<i>a</i>	<i>b</i>	<i>c</i>				
C ₆ H ₁₂ N ₄	Hexamethylenetetramine.....	C.	7.02			2	1.33s	(100, 112)	<i>u_N</i> = ca. 0.12; <i>u_C</i> = ca. 0.23s. Structure type (8a, 12a); space group T _h -4
C ₆ H ₁₄ O ₆	<i>d</i> (l)-Mannitol.....	R.	10.3s	8.1	4.5s	2	1.55	(27)	P. U. C.
C ₇ H ₆ O ₂	Benzoic acid.....	M.	5.44	5.18	21.6	4		(28)	$\beta = 97^\circ 5'$; P. U. C.
C ₈ H ₇ NO ₄	Ammonium hydrogen fumarate.....	T.	7.00	7.44	6.66	2		(29s)	$\alpha = 107^\circ 1'$, $\beta = 117^\circ 58'$, $\gamma = 69^\circ 16'$
C ₈ H ₈ ClN ₂ O ₄	Ammonium chlorofumarate.....	M.	9.80	6.70	6.73s	2		(29s)	$\beta = 108^\circ 25'$, Space group 2C-2(?)
C ₇ H ₆ O ₂	Salicylic acid.....	M.	11.5s	11.2s	4.93	4	1.58	(28)	$\beta = 91^\circ 22'$. P. U. C.
C ₇ H ₁₂ O ₄	α -Methyl glycoside.....	R.	10.8s	14.6s	5.61	4	1.46	(28)	P. U. C.
C ₈ H ₆ O ₂	<i>o</i> -Phthalic anhydride.....	R.	7.74	13.6s	5.86	4	1.54	(28)	P. U. C., S. P.
C ₈ H ₆ O ₄	<i>o</i> -Phthalic acid.....	M.	9.33	7.13	5.10	2	1.60	(28) cf. (61)	$\beta = 94^\circ 36'$. P. U. C., S. P.
C ₈ H ₁₀ O ₄	Metalddehyde.....	Tet.	10.36	4.10		8		(171, 216)	Space group 4C-5?
C ₈ H ₈ O ₂	<i>trans</i> -Cinnamic acid.....	M.	11.6s	14.1s	4.26	4	1.40	(28)	$\beta = 96^\circ 36'$. P. U. C., S. P.
C ₈ H ₁₀ O ₂	Hydrocinnamic acid.....	M.	12.9s	9.20	6.98	4	1.23	(28)	$\beta = 103^\circ 36'$. P. U. C., S. P.
C ₁₀ H ₈	Naphthalene.....	M.	8.34	5.98	8.68	2		(28, 27)	$\beta = 122^\circ 44'$. P. U. C., cf. (28)
C ₁₀ H ₈ O	α -Naphthol.....	M.	13.1	4.9	13.4	4	1.22	(28)	P. U. C. $\beta = 117^\circ 10'$
C ₁₀ H ₈ O	β -Naphthol.....	M.	11.70	4.28	17.4	4	1.22	(28)	P. U. C. $\beta = 119^\circ 48'$
C ₁₀ H ₁₀	Acenaphthene.....	R.	8.32	14.1s	7.26	4	1.19	(28)	P. U. C.
C ₁₀ H ₁₀ N ₂	Azobenzene.....	M.	12.5s	5.28	8.38	2	1.23	(28)	$\beta = 116^\circ$. P. U. C.
C ₁₀ H ₁₀ N ₂	Hydrazobenzene.....	R.	11.1s	9.93	9.33	4	1.17	(28)	P. U. C., S. P.
C ₁₀ H ₁₂ O ₁₁	Saccharose.....	M.	10.6s	8.7s	8.0s	2	1.57	(27)	$\beta = 105^\circ 44'$. P. U. C.
C ₁₂ H ₁₈ O ₂	Lauric acid.....	Tet.?	28.3		11.4	24	0.86	(28)	P. U. C., S. P. See Table C'.
C ₁₄ H ₈ O ₂	Anthraquinone.....	R.	12.0s	15.0s	2.69	2	1.40	(28)	P. U. C., S. P.
C ₁₄ H ₁₀	Anthracene.....	M.	8.58	6.02	11.18	2	1.25	(28, 27)	$\beta = 125^\circ$. P. U. C., cf. (28)
C ₁₄ H ₁₀	Phenanthrene.....	M.	9.56	6.72	7.55	2	1.18	(28)	$\beta = 92^\circ$. P. U. C., S. P.
C ₁₄ H ₁₀ O ₂	Benstil.....	H.	8.15		13.4s	3	1.41	(27)	P. U. C.
C ₁₄ H ₁₂	Stilbene.....	M.	9.6	8.9	12.6	4	1.25	(27)	$\beta = 118^\circ 40'$. P. U. C.
C ₁₄ H ₁₄	Dibenzyl.....	M.	12.7	6.1	7.4	2	1.18	(27)	$\beta = 119^\circ$. P. U. C.
C ₁₄ H ₁₆ O ₂	Myristic acid.....	H.?	57.4		11.4	72	0.83	(28)	P. U. C., see Table C'.
C ₁₄ H ₁₆ N ₂ O ₂	Indigotin.....	H.	20.2		12.1s	12	1.20	(28)	P. U. C., Measurements also on S. P.
C ₁₆ H ₃₂ O ₂	Palmitic acid.....	H.?	60.6		11.6	72	0.88	(28)	P. U. C., see Table C'.
C ₁₈ H ₃₆ O ₂	Elaidic acid.....	Tet.?	26.5		10.8	16	0.98	(28)	P. U. C., S. P., see Table C'.
C ₁₈ H ₃₆ O ₂	Stearic acid.....	H.?	62.0		10.7	72	0.94	(28)	P. U. C., S. P., see Table C'.
C ₁₈ H ₁₈	Triphenylmethane.....	R.	14.3s	25.6s	7.42	4		(28, 29) cf. (177, 178)	
C ₂₀ H ₂₀ O	Triphenylcarbinol.....	H.	16.5		8.8	6	1.23	(27)	P. U. C.
C ₂₀ H ₂₀ O ₂	α , α' -Distearin.....	H.?	81.5		10.8	48	0.82	(28)	P. U. C., S. P.

C'-TABLE.—LONG CHAIN COMPOUNDS

Arrangement by Classes

1. Aliphatic Hydrocarbons (320, 401)

Formula	Maximum spacing, Å	Spacings of broad lines, Å					
		<i>d</i> ₁	<i>d</i> ₂	<i>d</i> ₃	<i>d</i> ₄	<i>d</i> ₅	<i>d</i> ₇
C ₁₇ H ₃₆	24.3	4.25	3.93		2.54	2.32	
C ₁₈ H ₃₈ α	25.9		4.0				
C ₁₈ H ₃₈ β	23.9	4.58	3.80	3.66	2.61		2.05
C ₁₉ H ₄₀	26.9	4.22	3.84		2.52	2.25	
C ₂₀ H ₄₂ α	28.0		3.9				
C ₂₀ H ₄₂ β	26.2	4.63	3.82	3.61	2.59	2.12	2.03
C ₂₁ H ₄₄	29.4s	4.17	3.77	3.01	2.50	2.25	
C ₂₂ H ₄₆	32.2						
C ₂₄ H ₅₀	33.0s	4.18	3.80	3.02	2.50	2.25	
C ₂₇ H ₅₆	37.1	4.17	3.77	3.01	2.51	2.25	
C ₃₁ H ₆₄	43.0	4.14	3.74	2.99	2.49	2.21	
C ₃₅ H ₇₂	47.7						

Formula	Max. spacing	Formula	Max. spacing
C ₂₂ H ₄₆ (?)	30.6	C ₃₀ H ₆₂	40.4
C ₂₄ H ₅₀	32.9	C ₃₁ H ₆₄	41.6*
C ₂₅ H ₅₂	34.3		42.9†
C ₂₆ H ₅₄	35.6	C ₃₂ H ₆₆	42.7
C ₂₇ H ₅₆	37.7	C ₃₄ H ₇₀	45.3
C ₂₉ H ₆₀	39.4		

Specimens for (320) pressed, those for (401) melted on glass plates only.

* Melted.

† Pressed.

2. Aromatic Hydrocarbons

C₂₄H₁₈, Octadecylbenzene, *d*₁ = 49.2 (225)

3. Aliphatic Acids

a. Monobasic

Formula	Name	Maximum spacing, Å	Broad line spacing, Å				Lit.
			<i>d</i> ₂	<i>d</i> ₃	<i>d</i> ₄	<i>d</i> ₅	
CH ₃ O ₂	Formic	5.19					(309)
C ₂ H ₄ O ₂	Acetic	6.66					(309)
C ₃ H ₆ O ₂	Propionic	6.75	4.03			3.43	(309)
C ₄ H ₈ O ₂	Butyric	9.65	4.09	3.65		3.45	(309)
C ₅ H ₁₀ O ₂	Valeric	10.1(?)					(309)
C ₆ H ₁₂ O ₂	Caproic	14.6	4.14	3.65		3.47	(309)
C ₇ H ₁₄ O ₂	Heptonic	16.4	4.29	3.75	3.97	3.49	(309)
C ₈ H ₁₆ O ₂	Caprylic	19.0	4.14	3.65		3.48	(309, 354)
C ₉ H ₁₈ O ₂	Nonylic	22.9	4.22	3.71	3.97	3.48	(309)
C ₁₀ H ₂₀ O ₂	Capric	23.3	4.14	3.73			(354, 309, 274)
C ₁₁ H ₂₂ O ₂	Undecylic	25.8					(185)
C ₁₂ H ₂₄ O ₂	Lauric	27.0	4.11	3.68			(184, 354)
C ₁₄ H ₂₈ O ₂	Myristic	32.2	4.12	3.72			(184, 354)
C ₁₅ H ₃₀ O ₂	Pentadecylic	36.2	4.00	3.76			(185)
C ₁₆ H ₃₂ O ₂	Palmitic	34.7	4.08	3.65			(184, 354)
C ₁₇ H ₃₄ O ₂	Margaric	39.2	4.05	3.77			(185)
C ₁₈ H ₃₆ O ₂	Oleic	36.2(?)					(185)
C ₁₉ H ₃₈ O ₂	Isoleic	35.9					(185)
C ₁₉ H ₃₈ O ₂	Elaidic	48.3	4.03	3.65			(185)

3. Aliphatic Acids. a. Monobasic.—(Continued)

Formula	Name	Maximum spacing, Å d_1	Broad line spacing Å				Lit.
			d_2	d_3	d_4	d_5	
$C_{18}H_{36}O_2$	Stearic	38.7	4.05	3.62			(184, 354)
$C_{22}H_{44}O_2$	Erucic	46.3	4.22	3.72			(185)
$C_{22}H_{42}O_2$	Brassicic	59.9	4.25	3.72			(185)
$C_{22}H_{44}O_2$	Behenic	47.8	4.10	3.66			(184)

b. Dibasic

$C_4H_6O_4$	Succinic	4.5					(354)
$C_6H_{10}O_4$	Adipic	7.0					(354)
$C_7H_{12}O_4$	Pimelic	7.6					(354)
$C_8H_{14}O_4$	Suberic	9.3					(354)
$C_9H_{16}O_4$	Azelaic	9.6					(354)
$C_{10}H_{18}O_4$	Sebacic	11.4					(354)

4. Salts

Formula	Name	Maximum spacing Å d_1	Broad line spacing Å				Lit.
			d_2	d_3	d_4	d_5	
$PbC_{12}H_{22}O_4$	Caproate	20.0					(355)
$PbC_{14}H_{26}O_4$	Caprylate	25.4					(355)
$PbC_{16}H_{30}O_4$	Caprate	30.6					(355)
$PbC_{18}H_{34}O_4$	Laurate	35.8					(355)
$PbC_{20}H_{38}O_4$	Myristate	41.2					(355)
$PbC_{22}H_{42}O_4$	Palmitate	46.3					(355)
$PbC_{24}H_{46}O_4$	Oleate	37.5; 29.8					(355)
$PbC_{26}H_{50}O_4$	Elaidate	50.0					(355)
$PbC_{28}H_{54}O_4$	Stearate	51.3					(355)
$NaC_{12}H_{23}O_2$	Laurate	33.5	4.22	4.88			(208)
$NaC_{14}H_{27}O_2$	Myristate	38.5	4.18	4.9			(208)
$NaC_{16}H_{31}O_2$	Palmitate	43.5	4.15	4.9			(208)
$NaC_{18}H_{35}O_2$	Oleate	43.5					(63)

Similar results obtained with K and NH_4 oleates.

5. Esters

$C_{17}H_{34}O_2$	Methyl palmitate	22.0	4.07	3.72			(225)
$C_{18}H_{36}N_2O_5$	Ethyl <i>p</i> -azoxybenzoate	16.2	$d_1 = 19.9$ in the "smectic" state				(321)
$C_{18}H_{36}O_2$	Ethyl palmitate	23.2	4.07	3.67			(225)
$C_{19}H_{38}O_2$	Methyl stearate	24.0	4.07	3.74			(225)
$C_{20}H_{40}O_2$	Ethyl stearate	25.2	4.14	3.69			(225)
$C_{24}H_{48}O_2$	Octyl palmitate	30.4	4.16	3.72			(225)
$C_{26}H_{52}O_2$	Cetyl palmitate	40.4	4.05	3.69			(225)
$C_{34}H_{70}O_2$	Glycerol margarate	48.0					(355)

6. Ketones (319)

Formula	Name	Maximum spacing Å d_1
$C_{12}H_{24}O$	Di- <i>n</i> -hexyl	18.7
$C_{15}H_{30}O$	Methyl- <i>n</i> -tridecyl	42.4
$C_{17}H_{34}O$	Methyl <i>n</i> -pentadecyl	47.6
$C_{18}H_{36}O$	Methyl <i>n</i> -hexadecyl	50.0
$C_{18}H_{36}O$	Ethyl <i>n</i> -pentadecyl	25.2
$C_{19}H_{38}O$	Hexyl <i>n</i> -undecyl	25.2
$C_{19}H_{38}O$	Methyl <i>n</i> -heptadecyl	52.9
$C_{19}H_{38}O$	Propyl <i>n</i> -pentadecyl	26.3
$C_{20}H_{40}O$	Ethyl <i>n</i> -heptadecyl	27.3
$C_{21}H_{42}O$	Propyl <i>n</i> -heptadecyl	28.9
$C_{22}H_{44}O$	Hexyl <i>n</i> -pentadecyl	31.1
$C_{22}H_{44}O$	Di- <i>n</i> -undecyl	31.6
$C_{24}H_{48}O^*$	Hexyl <i>n</i> -heptadecyl	33.6
$C_{27}H_{54}O$	Di- <i>n</i> -tridecyl	37.0
$C_{31}H_{62}O$	Di- <i>n</i> -pentadecyl	41.1
$C_{34}H_{70}O$	Di- <i>n</i> -heptadecyl	47.2

* A few orders of 30.8Å also present.

7. Phenols (225)

$C_{22}H_{26}O$	<i>p</i> -Hexadecyl	46.5
$C_{24}H_{30}O$	<i>p</i> -Octadecyl	51.3

TABLE D.—ALLOYS

(a) Non-ferrous. Standard Arrangement. All Compositions in Atomic %

Pb-Sn.—0 to 3.6% Sn alloys are F.-c. cubic (like Pb) with a_0 decreasing to 4.931Å , taking a_0 for Pb as 4.942Å . 10% — 95% Sn alloys are mixtures of the Pb-like and Sn structures. 95% — 100% Sn alloys show no measurable distortion in size or shape of the Sn unit cell (206).

Hg-Sn.—The structure varies, as follows, with the atomic % of Hg: 0 to $\pm 2\%$, Tet.-Sn structure I; 2% I, with traces of "Hexagonal" amalgam, (composition unknown) structure II; 5%, I and II; 6%, trace of I with II; 6 to $\pm 17\%$, II; ± 17 to 33%, II and liquid alloy (229).

Hg-Pb.—A 20% Hg alloy had the F.-c. cubic structure (4b) of Pb, with a unit cell length 1.6% less than that of Pb (229).

Hg-Zn.—Two structures, the hexagonal Zn structure (d), and an "hexagonal" structure belonging to an amalgam of unknown composition. The relative intensities of the patterns of these two phases are as follows (229):

Atomic % Hg	0	10	20	35
Zn structure.....	strong	medium	weak	absent
"Amalgam" structure.....	absent	medium	strong	strong

Hg-Cd.—An 18% Hg amalgam gave a pattern substantially the same as that of Cd; 37 and 50% Hg amalgams yield a different pattern (229).

Cu-Si.—Though Si has the smaller atomic volume the unit cube of Cu which has dissolved Si is larger than that of pure Cu. No data available (84).

Cu-Sn.—Figure 12a. Black circles: metal melted in air; open circles: metal melted in vacuum (18, 372).

Cu-Zn.—Figure 13. Unless otherwise stated on the figure these data are from (198). Cf. (12, 199, 258, 375, 371) which gives a different structure for γ -brass.

Ag-Sn.—Solution of Sn increases the Ag unit though its atomic volume is less. No data available (84).

Ag-Zn.—The observed phases are the same as those for Cu-Zn alloys (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No. atoms in unit cell
β	38.25	Cubic	(1a, 1b)	3.156		2
γ	50.3	Cubic		9.327		52.37
ϵ	60.5	Hexagonal	Mg-like	2.818	4.456	2
η	78.1	Hexagonal	Mg-like	2.818	4.382	2
Hexagonal close-packed with Zn-like structure						

Ag-Cu.—Broken series of solid solutions. Both components F.-c. cubic (4b) (370).

At. % Cu.....	0	4	9.2	16-80	96.4	100
a_0	4.06	4.05	4.03	Superimposed patterns of Ag and Cu	3.61	3.61

Au-Zn.—These alloys show all the phases of Cu-Zn alloys and two additional (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No. atoms in unit cell
β	30.2	Cubic	(1a, 1b)	3.146		2
γ	36.9	Cubic		9.268		52.97
	41.1	Cubic		9.223		51.96
ϵ	67.5	Hexagonal	Mg-like	2.809	4.377	2
	72.3	Hexagonal	Mg-like	2.809	4.369	2
η	95.0	Hexagonal	Zn-like	2.674	4.887	2
γ' (AuZn ₃)?	50.2	Cubic	?	7.880		32
γ''			may be cubic			

Au-Cu.—Figure 12 (18, 145, 361).

Au-Ag.—Data conflicting. Probably an unbroken series of solid solutions, though marked variations from this relation have been reported. Figure 16 (18, 165, 239, 372).

Ir-Os.—A single alloy of unknown composition was found to be C.-p. Hex. (11).

Pd-H.—Data conflicting. One result (295, 376) shows that the Pd unit is swelled by an amount proportional to the quantity of occluded H (79). The other study (164) shows a discontinuous absorption of H in the sense that some crystals may be saturated though others in the same material have not begun to absorb gas. The length, a_0 , of the edge of the unit cube of the saturated solution was found to vary between 4.000 Å and 4.035 Å with values usually not less than 4.023 Å.

Pd-Cu and Pd-Au.—Figures 20 and 19 (301).

Pd-Ag.—(15) Figure 17 (165).

Mn-Cu.—67% Cu is F.-c. cubic, like Cu, and has $a_0 = 3.615$ Å, taking a_0 for Cu as 3.60 Å (18). 70% Cu is said to give $a_0 = 3.70$ Å (200, 384).

Ni-Cu.—Figure 15 (18, 197, 361, 370).

Cr-Ni.—100% to 40% Ni alloys are F.-c. cubic (like Ni) with values of a_0 which change proportionately to the % of Cr added from 3.521 Å (for Ni) to 3.576 Å (206).

W-Mo.—(67) Said to show an unbroken series of solid solutions. No numerical data available (18). No lines (86) have been found from a 1:1 alloy to indicate the existence of a compound W-Mo (239).

Al-Zn.—0 to 20% Zn alloys are F.-c. cubic (like Al), a_0 changing from 4.043 Å (for Al) to 4.034 Å. 20%–95% Zn alloys show mixtures of cubic Al and hexagonal Zn structures. 95%–100% Zn alloys are C.-p. hexagonal with no measurable distortion from size or shape of the Zn unit cell (206).

Al-Cu.—Figure 14. The data on this figure are from (22, 141, 197, 258).

Al-Ag.—The dissolving of Al in Ag increases the unit cube in the latter, though Al has a smaller atomic volume. No numerical data available (84).

Al-Mn-Cu.—Heussler Alloys. Alloy 15.9% Al, 23.9% Mn, 60.3% Cu is said to be F.-c. cubic with $a_0 = 3.70$ Å. Alloys 14.3% Al, 28.6% Mn, 57.1% Cu is said to be a mixture of the preceding structure with a smaller amount of a B.-c. cubic phase having $a_0 = 2.98$ Å (12, 297).

Mg-Sn.—0 to 67% Mg give the superimposed patterns of Sn and Mg₂Sn; 67–100% Mg yield the superimposed patterns of Mg₂Sn and Mg. No evidence of solid solution (370).

Mg-Pb.—0 to 67% Mg give the superimposed patterns of Pb and PbMg₂; 67–100% Mg yield the superimposed patterns of PbMg₂ and Mg. No evidence of solid solution (370).

Mg-Al.—91.2% Al is F.-c. cubic (4b) with $a_0 = 4.106$ Å, taking a_0 for Al as 4.05 Å. 7.3% Al is C.-p. hexagonal (d) with $a_0 = 3.151$ Å, $c = 5.23$ Å, taking a_0 for Mg as 3.17 Å and $c_0 = 5.17$ Å (197).

(b) Ferrous Alloys

Fe-C Steels.—(1) Austenitic Steels. Structure that of γ -Fe, F.-c. cubic (4b) (250–259).

Composition, wt. %	a_0 in Å	Remarks
(1) 1.25% C, quenched at 750°C.....	3.601	Contains also martensite.
(2) 1.98% C, quenched at 1100°C.....	3.629	Contains also martensite.
(3)* 1.34% C, 12.1% Mn, 0.52% Si, 0.1% P.....	3.624	A mixture of austenite and martensite.
(2) quenched at 750°C.....	3.606	
(4) 1.18% C, 24.3% Ni, 6.05% Mn quenched from 1000°C.....	3.64	
(5) 0.24% C, 25.2% Ni, quenched from 1000°C....	3.56	

* Density calculations thought to indicate that C is present in interstitial solid solution in steel No. (3).

(2) Martensite Steels. Structure that of α -Fe, B.-c. cubic (2a) (19, 122, 250–258).

(5) Chilled subsequently in liquid air	2.81	Partly martensite and partly austenite.
(2)	2.90	Martensite lines very diffuse.
(1)	2.88	Martensite lines very diffuse.
(6) 0.80% C quenched in oil from 750°C	2.89	Martensite lines very diffuse.
(7) 0.80% C, 0.14% Cr, 0.35% Mn, 0.19% Si	2.851	Broad lines, less intense than from Fe.
(8) 1.31% C, 0.12% Cr, 0.24% Mn, 0.17% Si	2.851	Density calculations from this steel thought to indicate that C isomorphously replaces Fe unless martensite is annealed when it is a mixture of α -Fe with cementite.

Fe-Si.—(207, 252, 389).

Weight % Si.....	0-15	17-30	33	40	50	75-100
Phases.....	Fe	Fe + FeSi	FeSi	FeSi + FeSi ₂	FeSi ₂	FeSi ₂ + Si

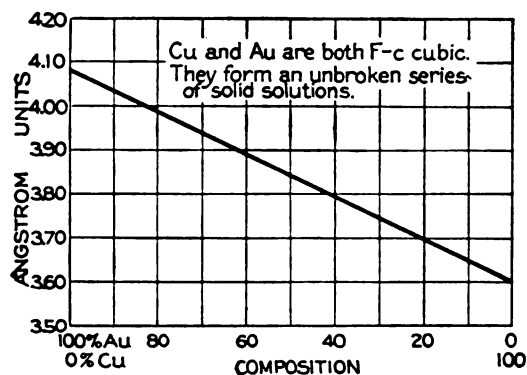


FIG. 12.—The diffraction data on Cu-Au alloys.

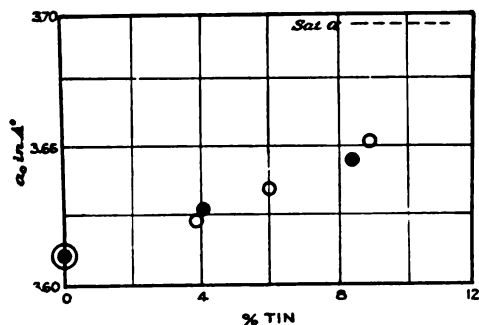


FIG. 12a.—The diffraction data on Cu-Sn alloys.

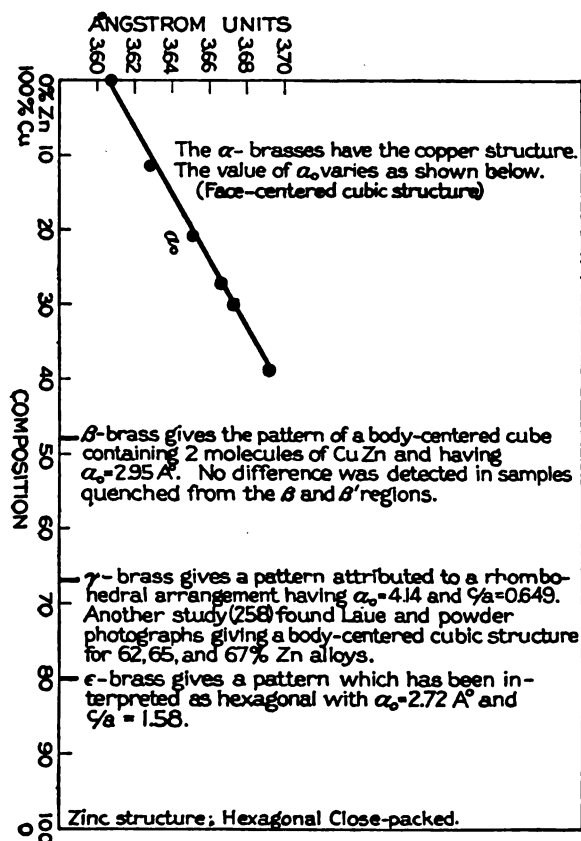


FIG. 13.—The diffraction data on brasses.

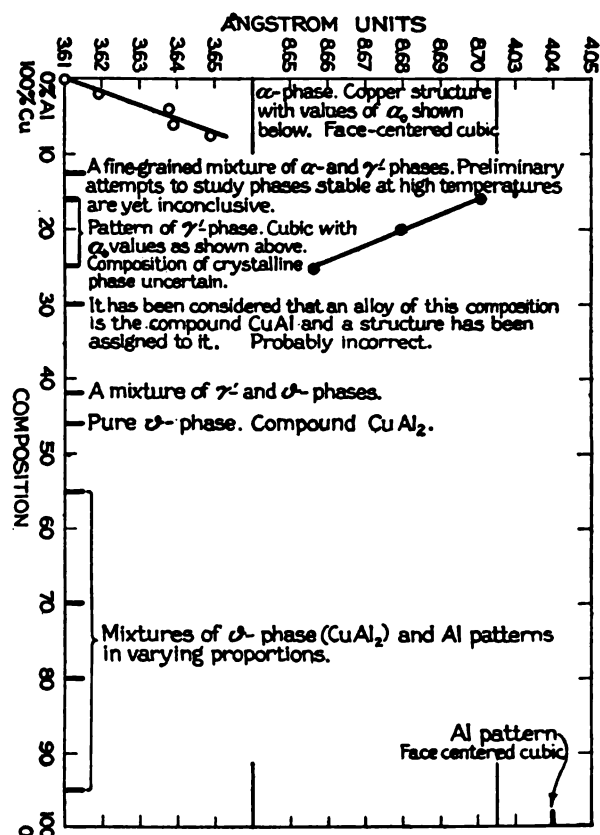


FIG. 14.—The diffraction data on Cu-Al alloys.

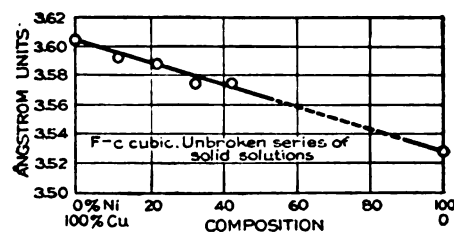


FIG. 15.—The diffraction data on Cu-Ni alloys.

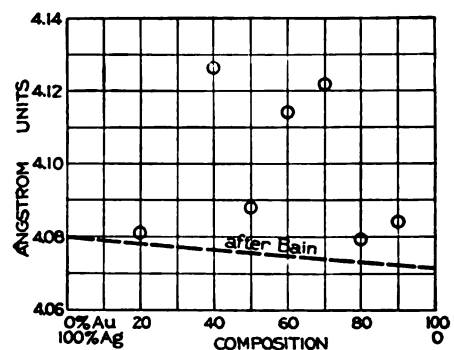


FIG. 16.—The diffraction data on Ag-Au alloys.

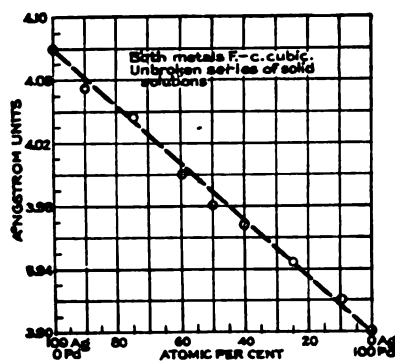


FIG. 17.—The diffraction data on Ag-Pd alloys.

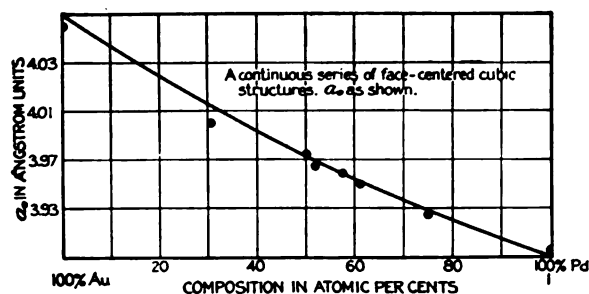


FIG. 19.—The diffraction data on Au-Pd alloys.

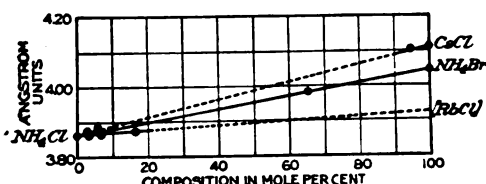


FIG. 21a.—The diffraction data on solid solutions of the alkali halides.

Fe-Mn.—These alloys are said to have the following structures. No numerical data available (18).

Atomic % Mn.	0-30	30-60	60-100
Structure.....	B.-c. cubic (2a)	F.-c. cubic (4b)	Complex Mn

Fe-Co.—No numerical data available (12).

Weight % Co...	0-80	85	90-98	98-100
Structure.....	B.-c. cubic (2a)	B.-c. (2a) with F.-c. (4b)	F.-c. cubic (4b)	F.-c. (4b) with C.-p. hex.

Fe-Ni.—The best available data are shown in Fig. 18. The fused alloys were swaged, drawn and rolled into thin tapes. Spacings from photographs of these specimens without further treatment are shown as open circles, results after (1) annealing at 900-950°C followed by slow cooling, black circles; (2) after an additional heating to 600°C followed by rapid cooling in the air, crosses; and (3) after cooling for a time in liquid air following (1), triangles (12, 168).

Fe-Cr.—Interpretation of data uncertain (18).

Fe-W and Fe-Mo.—It is said that Fe dissolves a few atomic percents of each of these metals without apparent alteration in the size of the unit cell. In each case a 1:1 compound is formed. No numerical data available (18).

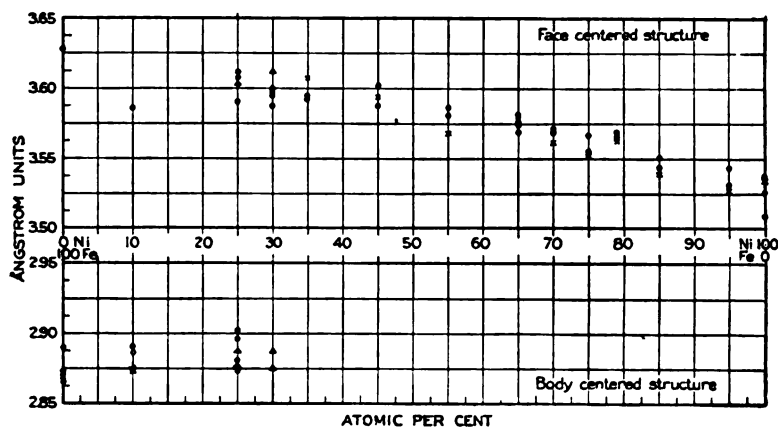


FIG. 18.—The diffraction data on Fe-Ni alloys.

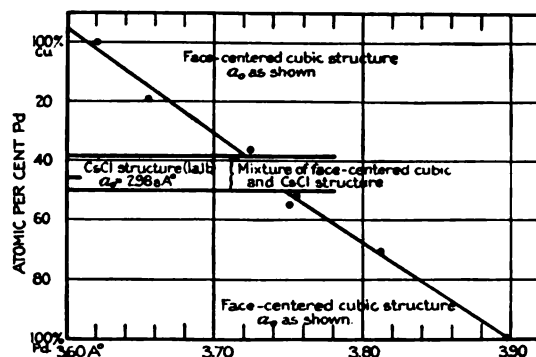


FIG. 20.—The diffraction data on Cu-Pd alloys.

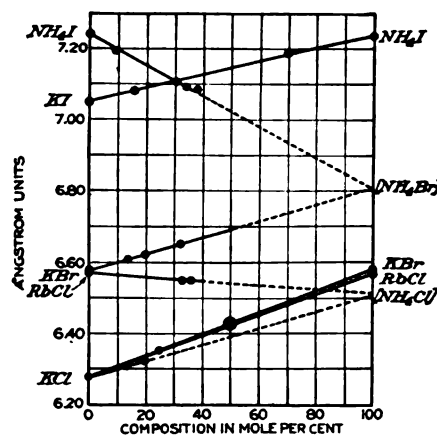


FIG. 21b.—The diffraction data on solid solutions of the alkali halides.

TABLE.—THE POSITIONS OF X-RAY DIFFRACTION BANDS FROM LIQUIDS

Liquid.....	Angle of Deviation and Wave Length, λ , of X-rays Used				
	A		N ₂		O ₂
Angle, deg.....	13.0; 18.9	27	11.3; 17.0	12.5; 19.5	27
λ , in Å.....	0.712	1.54	0.712	0.712	1.54
Lit.....	(304)	(303)	(304)	(303)	(303)

Liquid.....	H ₂ O				CH ₃ CHO
	Acetaldehyde				
Angle, deg.....	13.4	29	13.2	24	22.7
λ , in Å.....	0.712	1.54	0.712	1.54	1.54
Lit.....	(304)	(303)	(304)	(303)	(373)

Liquid.....	C ₂ H ₅ OH	C ₄ H ₈ O ₂ Butyric acid	C ₄ H ₈ O ₂ Ethyl acetate	(C ₂ H ₅) ₂ O
Angle, deg.....	22	20.7; 36.5	20.7	19
λ , in Å.....	1.54	1.54	1.54	1.54
Lit.....	(303)	(373)	(373)	(303)

Liquid.....	C ₆ H ₆	(C ₂ H ₄ O) ₂ Paraldehyde	C ₆ H ₅ CHO Benzaldehyde
Angle, deg.....	8.5	18	23.3
λ , in Å.....	0.712	1.54	1.54
Lit.....	(301)	(302, 303)	(373)

Liquid.....	C ₈ H ₁₈	C ₉ H ₁₂ Mesitylene	C ₁₄ H ₁₂ O ₂ Benzyl benzoate
Angle, deg.....	8.1	4.1; 6.2	18.3; 42.7; 65.8
λ , in Å.....	0.712	0.712	1.54
Lit.....	(301)	(301)	(373)

F-TABLE.—DATA ON SOLID SOLUTIONS OF SALTS

Alkali Halides.—For data on the solutions NH₄I-NH₄Br, NH₄I-KI, NH₄Br-KBr, RbCl-NH₄Cl, NH₄Cl-KCl, KCl-RbCl, KCl-KBr, CsCl-NH₄Cl, NH₄Br-NH₄Cl, RbCl-NH₄Cl see Fig. 21 (120). For additional data on KBr-KCl see (387, 388).

AgCl-NaCl (387).—Broken series of solid solutions. Quenched preparations: Both patterns present together.

Annealed	Composition mol % AgCl	a_0 Å
	100	5.53
	75	5.54
	50	5.57

AgCl-AgBr (402).—Both structures like NaCl (4b, 4c). Unbroken series of solid solutions.

Composition mol % AgCl	a_0 Å
0	5.77
20	5.72
40	5.68
50	5.65
60	5.63
80	5.59
100	5.54

AgBr-AgI (402).—Broken series of solid solutions.

Com- position mol % AgI	a_0					Precipi- tated
	Fused and slowly cooled		Fused and quenched			
	Structure (4b, 4c)	Structure (4b, 4d)	Structure (4b, 4c)	Structure (4b, 4d)		
0	5.768		5.768		5.768	
10	5.814		5.816		5.806	
20	5.842		5.854		5.84	
30	5.86		5.876		5.878	
40	5.896	(6.47)	5.908			
50	5.912	(6.47)	5.932			
60	5.918	6.47	5.96	(6.48)		
70	6.014	6.48	5.956	6.48		
	5.946					
	5.994					
80	5.916	6.47	(5.892)	(6.48)		
90		6.472	5.898	6.483		
95		6.481		6.487		
100		6.493		6.493		

LITERATURE

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SOME NUMERICAL DATA PERTAINING TO DISPERSOIDOLOGY

P. P. VON WEIMARN

From the large and heterogeneous mass of numerical data recorded in the literature of "Colloids," it seems desirable to present here only some selected illustrative examples of results of physical measurements which meet the following requirements: (1) The composition of the system is definite, reproducible, and exactly known; (2) all of the essential variables which affect the system are understood and are accurately controlled or measured; (3) the system, its behavior, and the resulting quantitative data are reproducible in the hands of any investigator working under *these same* controllable conditions; and (4) the examples selected shall be illustrative of some general law describing the behavior of dispersed systems.

As meeting the above conditions, the following examples have been selected and are presented in graphical form. Concise explanations are given in connection with the graphs. For a detailed description, explanation, discussion, and bibliography, the reader is referred to von Weimarn, *Chem. Rev.* **2**: 217; 25.

THE PRECIPITATION LAWS

Figures 1-9 illustrate the following precipitation laws: With increasing concentration of the reacting solutions, the average size of the precipitated crystalline individuals (*not their aggregates*) (1) passes through a maximum during, and (2) decreases continually after the completion of, the process of direct crystallization; (3) for the same absolute concentration of the reacting solutions (*other conditions being equal*), with decreasing solubility of a substance (Fig. 4; cf. Fig. 13), the average size of the precipitated crystals also decreases.

Figures 10-13 show that, if the aggregation of the individual ultramicrocrystals has not *proceeded too far*, the second law of precipitation remains valid; and besides they illustrate the law: (4) With increasing viscosity of the dispersion medium, the average size of the particles decreases (Fig. 12) (³, ⁴); cf. (1).

The following general remarks apply to the figures: (1) The dispersion medium is indicated thus (60 vol. % C_2H_5OH); (2) mixing was brought about in all cases by pouring and shaking. The direction of pouring is indicated by the arrow. (3) In Figs. 1-9, the volumes mixed in each experiment satisfied the relation, concentration \times volume = a constant (approx.), for a given dispersion medium; (4) the time, t_0 , represents the period (ca. 10-15 min) required for the operations of sampling and photomicrographing; (5) all data shown are the averages of at least two independent experiments.

1. Precipitation of Ag_2SO_4 .—Reaction.— $2AgNO_3 + MnSO_4 = Ag_2SO_4 + Mn(NO_3)_2$ (Figs. 1-7). In Figs. 4-5, per liter of final

solution, $C = Ag_2SO_4$ produced by the reaction and S = its solubility, both in g-equivalents (⁸).

2. Precipitation of $Ag_2C_2H_3O_2$.—Reaction.— $AgNO_3 + KC_2H_3O_2 = Ag_2C_2H_3O_2 + KNO_3$ (Figs. 8-9) (⁶). These curves show the effect of time; the periods of time for the four curves are the same in both figures.

3. Precipitation of Se. —Reaction.—(a) 5 cc of aniline (an.) containing m mg of Se are poured into 100 cc of 93.5 wt. % C_2H_5OH (alc.) or (Fig. 13) mixtures thereof with an. or (Fig. 12) glycerol (gl.). $t = 20^\circ$ (Figs. 10-13 *a* curves) (⁷). (b) As in (a) but with quinoline (q.) instead of aniline and using 90 wt. % C_2H_5OH (Figs. 10-13 *b* curves) (⁷).

4. Effects of Salts Dissolved in the Dispersion Medium on the Duration of Life of Dispersoidal Solutions.—(a) $BaSO_4$. Reaction.—50 cc ($2a + 2x$ equiv.) $BaR_2 + 50$ cc ($2a$ equiv.) $MnSO_4 = 1$ equiv. $BaSO_4 + 1$ equiv. $MnR_2 + x$ equiv. BaR_2 . Dispersion medium, 63 wt. % C_2H_5OH (Figs. 14-17) (⁵).

(b) S .—Dispersoidal solution of sulfur prepared by the method of grinding with grape-sugar. Ca. 25 mg S per liter of H_2O ; particles ca. 85μ (Figs. 18-23). C = millimols salt per liter. The dotted horizontal is for $C = 0$. To the right of the dotted vertical (Fig. 23) the disperse phase begins to dissolve by chemical action (¹⁰); cf. (2).

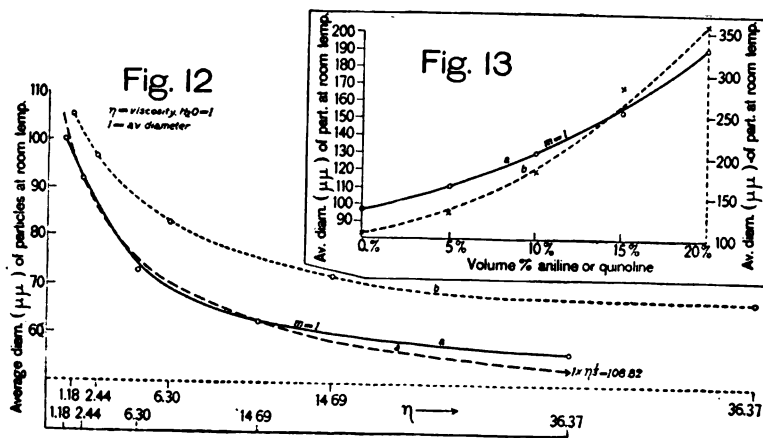
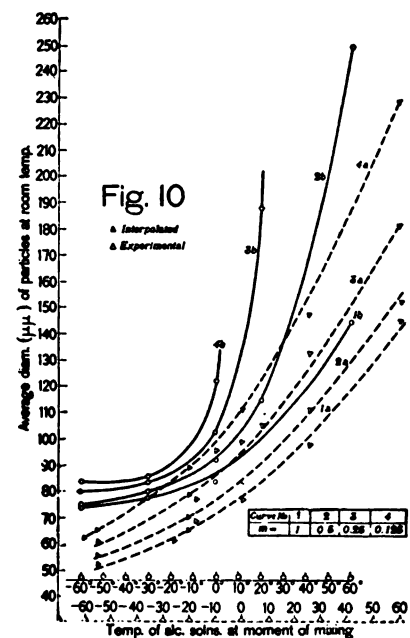
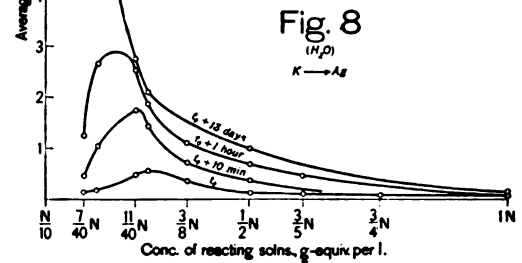
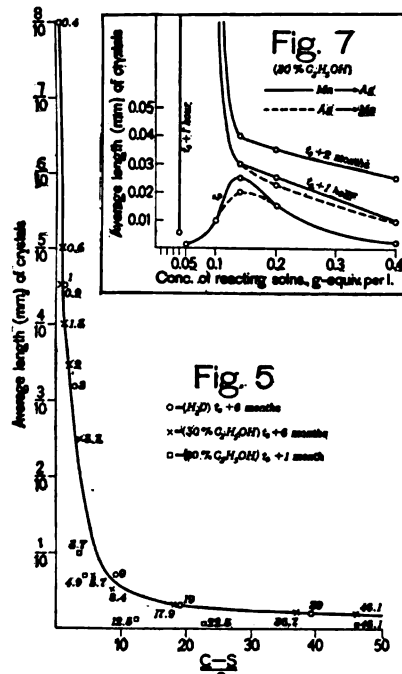
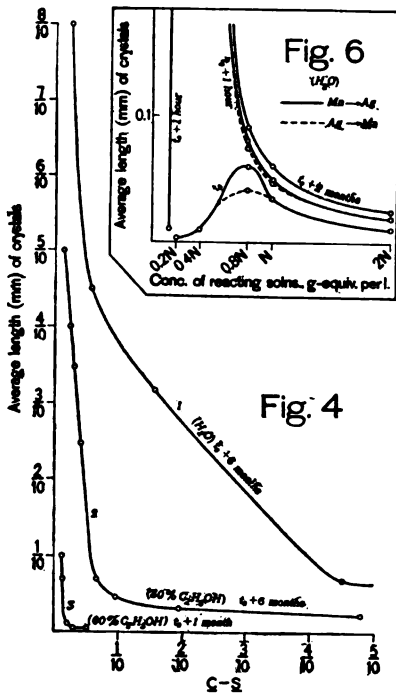
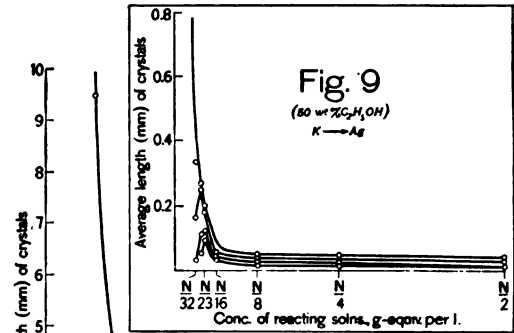
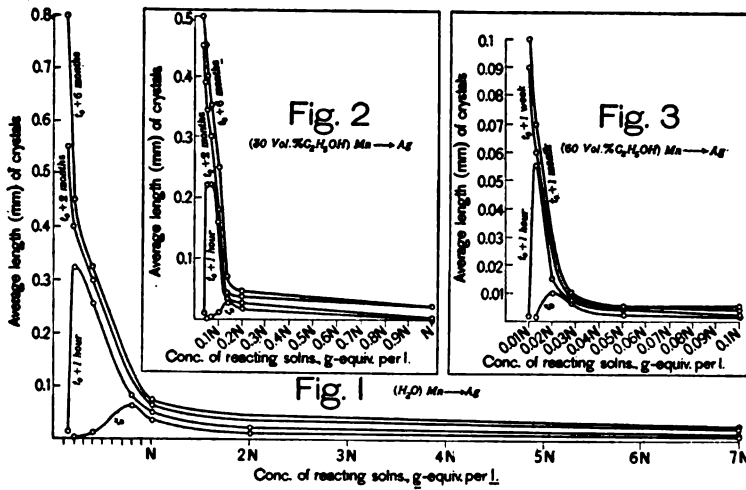
(c) $Al(OH)_3$.—Prepared as in (b) *supra*. Ca. 55 mg $Al_2O_3 \cdot 3H_2O$ per liter of H_2O ; particles ca. 90μ (Fig. 24). The dotted horizontal is for $C = 0$. Dissolving begins at points marked with crosses (¹¹); cf. (2).

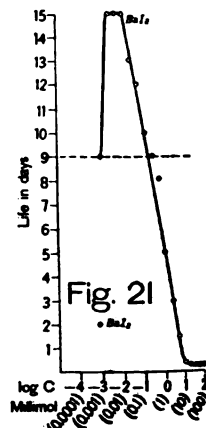
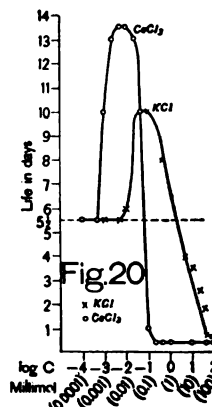
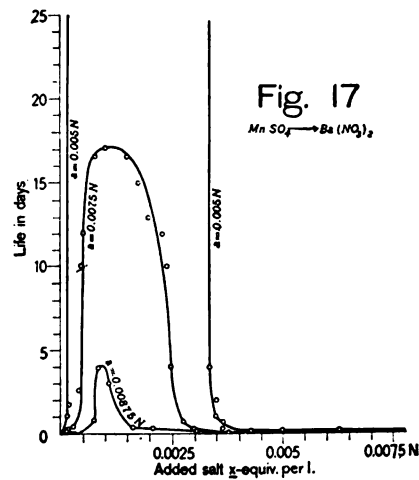
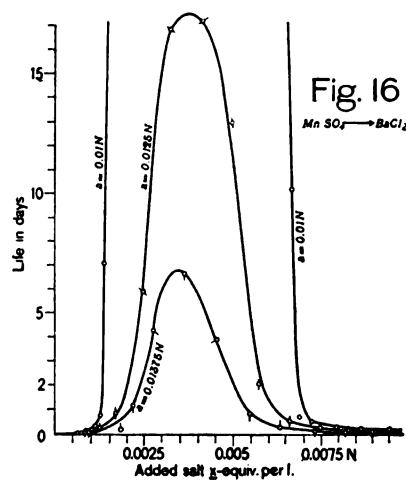
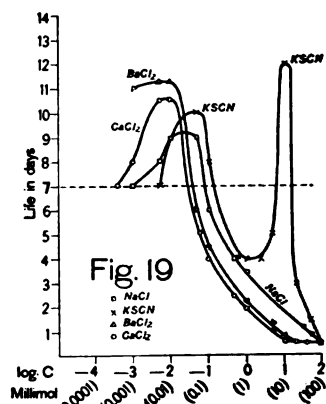
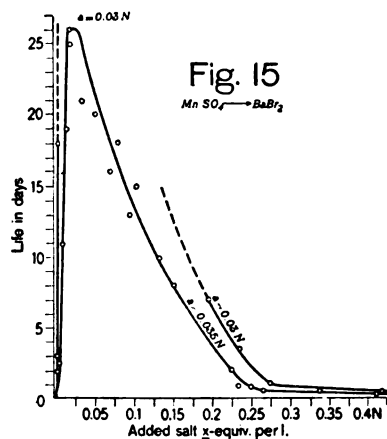
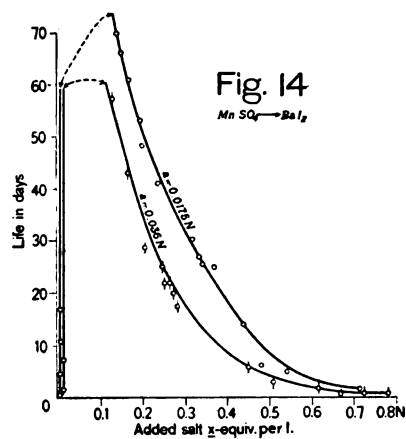
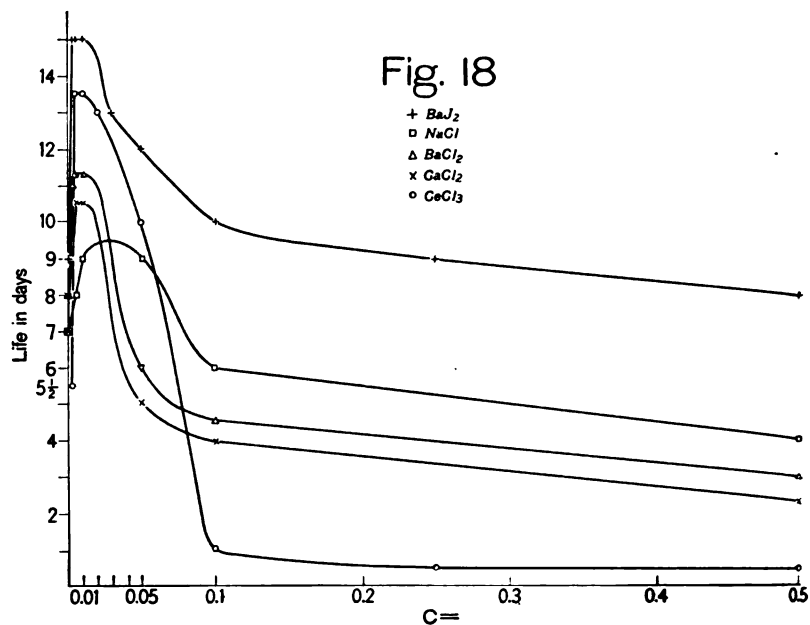
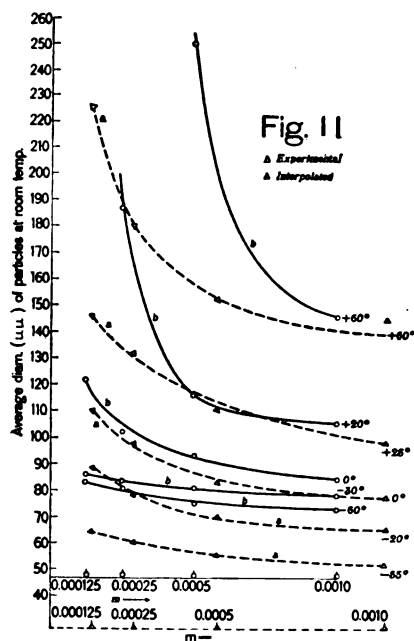
5. Adsorption and Solubility of Salts.—Adsorbent used— $BaSO_4$, extra pure; 20 g used per 100 cc of the salt solution. After shaking the solution with the adsorbent for 10 min, 24 hr. were allowed for the precipitate to settle. Fifty cc of the upper clear layer were used for analysis. Because partial dispersion occurred in the case of $BaCl_2$ in dilute C_2H_5OH solutions, these were centrifuged before analysis (Fig. 25) (⁹).

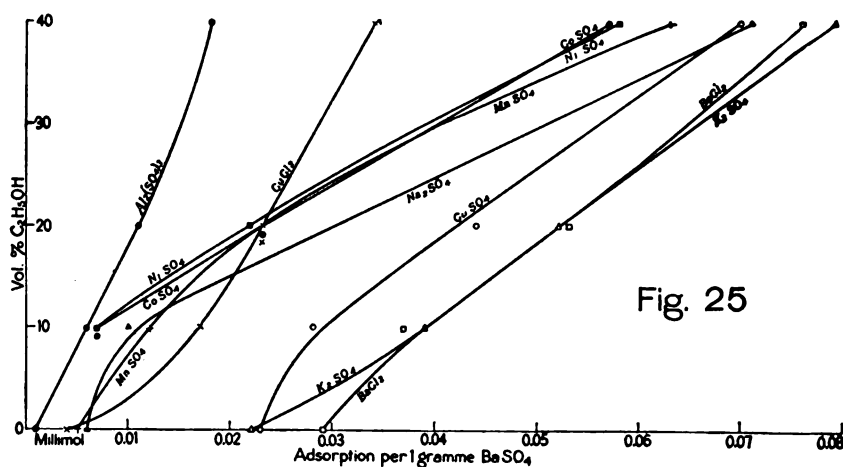
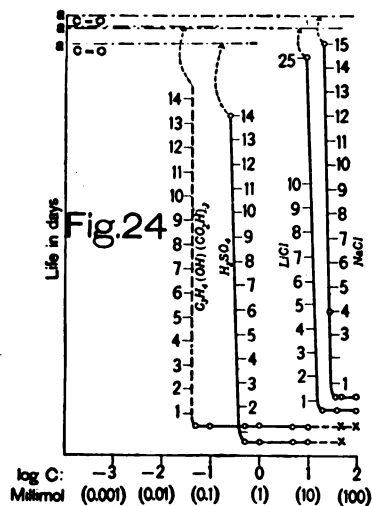
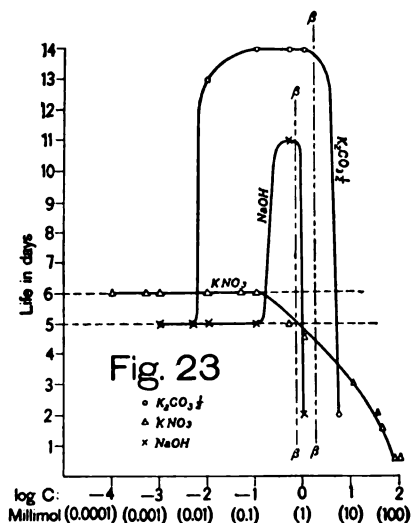
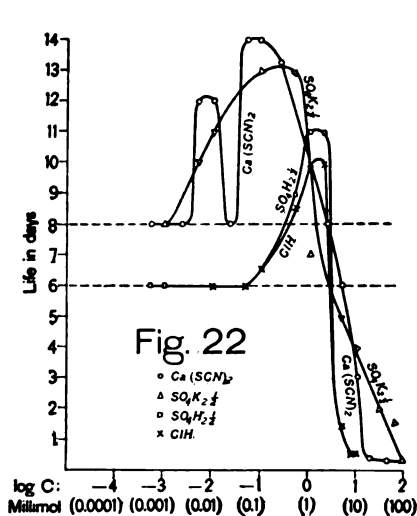
LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Odén, *55*, **36**: 120; 20. (²) Ostwald, *55*, **36**: 28, 69; 20. (³) von Weimarn, *55*, **38**: 267, 624; 06. (⁴) von Weimarn, *53*, **38**: 933, 1400; 06. *55*, **2**: 76; 07. *287*, **13**: 44; 23. (⁵) von Weimarn, Aoki and Kataoka, *O. In part in von Weimarn, 288*, **3**: 199; 24. (⁶) von Weimarn and Hori, *O. In part in von Weimarn and Morishima, O. In part in von Weimarn 55*, **36**: 10; 25. (⁷) von Weimarn and Otsuka, *O. In part in von Weimarn, 55*, **33**: 234; 23. (⁸) von Weimarn, Schochara and Takashige, *O. In part in von Weimarn, 55*, **33**: 242; 23. (⁹) von Weimarn and Utsino, *55*, **36**: 265; 25. (¹¹) von Weimarn and Utsino, *O.*







SWEETENING AGENTS. RELATIVE SWEETENING POWER

C. F. WALTON, JR.

The relative sweetness of various substances is usually cited in comparison with sucrose as unity. Since the concentration of the standard sucrose solution employed by different investigators has varied from 1 to 10%, and since the degree of sweetness does not decrease proportionately with dilution, the values reported in the literature vary accordingly, and are difficult to arrange accurately in numerical order. The following table, therefore, indicates only the approximate degree of sweetness, as reported by different investigators employing a variable procedure.

RELATIVE DEGREE OF SWEETNESS
(Sucrose = 1.0)

Name	Formula	Degree of sweetness	Lit.
Lactose.....	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	0.27-0.28	(26)
Dulcitol.....	$\text{C}_6\text{H}_{14}\text{O}_6$	0.41	(26)
Mannitol.....	$\text{C}_6\text{H}_{14}\text{O}_6$	0.45	(26)
Sorbitol.....	$\text{C}_6\text{H}_{14}\text{O}_6$	0.48	(26)
Glycerol.....	$\text{C}_3\text{H}_8\text{O}_3$	0.48	(26)
Glycol.....	$\text{C}_2\text{H}_6\text{O}_2$	0.49	(26)
Dextrose (<i>d</i> -glucose)	$\text{C}_6\text{H}_{12}\text{O}_6$	0.50-0.60	(10, 26, 29)
Maltose.....	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	0.60	(26, 29)

RELATIVE DEGREE OF SWEETNESS.—(Continued)

Name	Formula	Degree of sweetness	Lit.
Invert sugar (dextrose + levulose)	$C_6H_{12}O_6 + C_6H_{12}O_6$	0.78–0.95	(10, 26, 29)
Sucrose.....	$C_{12}H_{22}O_{11}$	1.00	(10, 26, 29)
Levulose (<i>d</i> -fructose)	$C_6H_{12}O_6$	1.03–1.50	(10, 26, 29)
<i>p</i> -Anisylurea.....	$CH_3OC_6H_4NHCONH_2$	18	(5)
Chloroform.....	$CHCl_3$	40	(31)
Glucin.....	Mixture	100	(11)
<i>p</i> -Methylsaccharin..	$CH_3C_6H_4COSO_2NH$	200	(19)
Dulcin (<i>p</i> -phenetylurea)	$C_6H_5OC_6H_4NHCONH_2$	70–350	(11, 26)
6-Chlorosaccharin...	$ClC_6H_4COSO_2NH$	100–350	(19)
<i>n</i> -Hexylchloromalonamid	$n-C_6H_{13}CCl(CONH_2)_2$	300	(11)
Saccharin (<i>o</i> -benzoesulfonimid)	$C_6H_4COSO_2NH$	200–700	(11, 26)
Perillaldehyde α -anti-aldoxime (peryllartine)	$C_8H_8C(CH_3)CH_2CHNOH$	2000	(16)

LITERATURE

(For a key to the periodicals see end of volume)

The following list contains certain general references on methods of testing relative sweetening power, etc.

- (1) Auerbach, *#18*, 10: 710; 22. (2) Barral and Ranc, *#71*, 56: 712; 18. (3) Barral and Ranc, *#83*, 17: 16; 20. (4) Becker and Hersog, *#2*, 54: 496; 07. (5) Boedecker and Rosenbuch, *#73*, 30: 251; 20. (6) Braun and Rawicz, *#5*, 49: 799; 16. (7) Cohn, *Die Organischen Geschmacksstoffe* (Siemanroth, Berlin, 1914). (8) Cohn, *196*, 22: 1; 16. (9) Cohn, *#74*, 55: 735, 763; 14. (10) Deerr, *#75*, 24: 481; 22. (11) Dox and Houston, *1*, 48: 1278; 24. (12) Dyson, *#76*, 11: 572; 24. (13) Foerster, *#82*, 23: 400; 11. (14) Fränkel, *Arsneimittelsynthese* (Springer, Berlin, 1921): 134–53. (15) Furukawa, *Japanese Patent* 35332; 19. (16) Furukawa, *41*, 41: 706, 979; 20. (17) Hermann, *13*, 439: 163; 22. (18) Holleman, *70*, 40: 446; 21. (19) Holleman, *70*, 42: 830; 23. (20) Holleman and Choufoer, *64V*, 33: 307; 24. (21) Kionka and Sträts, *#77*, 95: 241; 22. (22) Kodama, *41*, 41: 495; 20. (23) Lasarev, *#78*, 194: 293; 22. (24) Oertley and Myers, *1*, 41: 855; 19. (25) Ogilvie, *#75*, 24: 288; 22. (26) Paul, *#79*, 43: 137; 22. (27) Paul, *#80*, 26: 610; 22. (28) Paul, *#85*, 125: 97; 21. (29) Sale and Skinner, *45*, 14: 522; 22. (30) Speckam, *#75*, 32: 83; 22. (31) Sternberg, *#81*, 38: 272; 05. (32) Zuntz, *#82*, 23: 385; 10.

ODORIFEROUS MATERIALS

H. ZWAARDEMAKER

The unit used for expressing odor is the *olfacty*, the normal stimulus threshold for a given odor.

The characteristic grouping giving rise to odor is termed odoriphore (8), also called aromatophore (Klimout, 1897) and osmophore (Rupe, 1900). The principal odoriphores are: $\leftarrow C(:O)O$ —Alkyl, esters; $\leftarrow C(:O)H$, aldehydes; $\leftarrow CO$, ketones; Alkyl—O—Alkyl, ethers; $\leftarrow C=OH$, alcohols; $\leftarrow C(:O)OH$, acids; $\leftarrow NO_2$, nitrites; $\leftarrow CN$, nitriles; $\langle \text{cyclohexane} \rangle$, terpenes; $\langle \text{pinene} \rangle$, pinenes; $\leftarrow S-S$, sulfides; $\leftarrow As-As$, arsenides; $\leftarrow As-O-As$, cacodyls; $\leftarrow Hal$, halogens; $\langle \text{pyridine} \rangle$, pyridine; $\langle \text{pyrrole} \rangle$, pyrrole.

CLASSIFICATION

LINNÉ, MODIFIED BY ZWAARDEMAKER

Type	Key letter
Odores aetherei Lorry (Ethereal).....	A
Odores aromatici Linné (Aromatic):	
1. Almond.....	B
2. Camphoric.....	C
3. Citric.....	D
Odores fragantes Linné (Balsam):	
1. Floral.....	E
2. Lilylike.....	F
3. Vanillin.....	G
Odores ambrosiae Linné (Musk).....	H
Allyl.....	I
Cacodylic.....	J
Odores empyreumatic Haller (Empyreumatic).....	K
Odores hircini Linné (Caprylic).....	L
Odores tetri Linné (Narcotic).....	M
Odores nauseois Linné (Nauseous).....	N

Intensity.—The intensity of the odor of an odorivector (8) depends on (1) its volatility from dilute solution, (2) its rate of diffusion, (3) its absorption by a humid surface and (4) its solubility in liquids. (All odorous substances are soluble in oil (2).) The significance of an odor as a reflex stimulus depends on physiological, its pleasing or repulsive value on psychological conditions.

VOLATILITY OF ODOR FROM PARAFFINIC SOLUTIONS (4)

Substance	Concn. per cent	Volatility 10^{-4} g per min
Ethyl sulfide (I).....	1	0.14
Scatole (N).....	1	0.18
Valeric acid (L).....	0.1	0.28
Guaiacol (K).....	1	0.5
Pyridine (M).....	10	0.93
Isoamyl acetate (A).....	5	3.6
Terpineol (C).....	25	7.5
Nitrobenzene (B).....	50	9.2

DIFFUSION IN FREE AIR IN NEIGHBORHOOD OF SOURCE (10)

	cc per sec		cc per sec
Eugenol (C).....	1.3	Ethyl ether (A).....	4.4
Camphor (C).....	2.1	Ethylacetone (A).....	10

Extremes—ethyl acetate (A) and naphthalene (K). The anemodispersibility of odors depends on the size of the cloud and the velocity of the wind.

Spray Electricity.—All odorous substances lower the surface tension of water and therefore produce static electricity by spraying an aqueous solution of the odorivector against a disc well insulated with amber and paraffin. The value is expressed as 10^{-10} coulomb per cc of a saturated solution.

Substance	10^{-10} coulombs	Lit.
Cumidine (K).....	0.2	(12)
Aniline (K).....	0.4	(6)
Toluidine (K).....	0.4	(6)
Xylidine (K).....	0.9	(6)
Scatole (N).....	1.0	(12)
Trinitroisobutyltoluene (H).....	1	(12)
Pseudocumene (K).....	3.4	(2)
Ethyl acetate (A).....	3.5	(2)
Xylene (K).....	3.8	(6)
Aniline (K).....	4.8	(2)
Toluene (K).....	5.1	(2)
Thymol (C).....	6.5	(2)
Benzene (K).....	7.5	(2)
Toluidine (K).....	7.9	(2)
Xylidine (K).....	9.3	(2)
Nitrobenzene (B).....	9.6	(2)
Vanillin (G).....	10	(2)
Dimethylaniline (K).....	11.6	(6)
Benzaldehyde (B).....	12.4	(2)
Anisaldehyde (G).....	14.8	(2)
Phenol (K).....	15.2	(2)

Substance	10^{-10} coulombs	Lit.
Xylenol (K).....	17	(2)
Ethyl alcohol (A).....	17.2	(2)
Cresol (K).....	19.1	(12)
Camphor (C).....	20.3	(12)
Heliotropin (F).....	44	(2)
Vanillin (G).....	47	(12)
Heliotropin (F).....	52	(12)
Acetone (A).....	60	(12)
Guaiacol (K).....	81.1	(2)
Carvacrol (C).....	82.3	(2)
Terpineol (E).....	89.1	(2)
Amyl acetate (A).....	96.4	(2)
Ethyl acetate (A).....	122	(12)
Guaiacol (K).....	289	(12)
Terpineol (E).....	296	(12)
Citral (D).....	360	(12)
Methyl anthranilate (E).....	602	(12)

RELATION BETWEEN SPRAY ELECTRICITY AND CONCENTRATION
OF AQUEOUS SOLUTIONS (12)

	CHARGE IN 10^{-10} COULOMBS PER CC						
Degree of saturation.....	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$
Coumarin.....	6.5	2	0.5	0	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$
Heliotropin.....	52	22	10	2	1.4	1.4	0
Vanillin.....	72	32	6	2	0.5	0	

ADSORPTION OF ODORS BY SURFACES EXPRESSED AS THE DURATION OF THE AFTER EFFECT FOLLOWING AN EXPOSURE TO A CONTINUOUS STREAM OF ODORIFEROUS AIR FOR 5 MINUTES (11). THE TERM sec DENOTES A FEW SECONDS, m = MINUTE, d = DAY, h = HOUR, min = SOME MINUTES

	Alumin- ium	Copper	Glass	Gold	Iron	Lead	Nickel	Porce- lain	Silver	Steel	Tin	Zinc
Ethyl disulfide.....	1 m	sec	sec	sec	sec	1 m	sec	2 m	sec	sec	sec	sec
Guaiacol.....	15 m	3 m	1 m	12 m	8 m	sec	5 m	5 m	0	7 m	8 m	25 m
Ionone.....	2.5 d	2 d	sec	.....	4 d	1 d	2 d	sec	sec	4 d	min	
Isoamyl acetate....	0	0	0	0	sec	0	sec	15 m	0	2 m	0	sec
Muscon.....	1 d	4 d	1 d	2 d	min	12 d	4-9 d	sec	2 d	sec	4 d	3 d
Nitrobenzene.....	sec	sec	sec	sec	sec	sec	sec	8 m	sec	sec	sec	sec
Pyridine.....	0	2 m	0	0	45 m	sec	sec	5 m	0	30 m	0.5 m	2.5 m
Scatole.....	9 d	3 d	1.5 h	1.5 d	10 d	10 d	3.5 d	0	1 d	20 d	7 d	14 d
Terpineol.....	0	sec	0	0	sec	0	0	5 m	sec	4 m	0	0
Valeric acid.....	3 m	0	30 m	sec	0	0	sec	0	5 m	0	2 m	0

Destruction of Odors by Ultraviolet Light.—The values are expressed as number of minutes required to reduce the odor in air from 2 to 1 olfactory by the radiation from a quartz mercury lamp (7).

Substance	Time	Substance	Time
Apiol (C).....	0.10	Methyl salicylate (C)...	0.30
Valeric acid (L).....	0.10	Trimethylamine (J).....	0.30
Menthol (C).....	0.15	Methyl nonyl ketone (C)	0.35
Ethyl sulfide (I).....	0.25	Thymol (C).....	0.40
Carvacrol (C).....	0.25	Borneol (C).....	0.45
Bornyl acetate (C).....	0.30	Isoamyl acetate (A).....	0.45
Caproic acid (L).....	0.30	Pyridine (M).....	0.45

Substance	Time	Substance	Time
Safrol (C).....	0.50	Methylheptenone (A)...	2.30
Salicylaldehyde (C).....	0.50	Eugenol (C).....	3
Scatole (N).....	0.50	Styrone (F).....	3
Citral (D).....	0.55	Coumarin (G).....	3.30
Indole (N).....	1.0	Ethyl isovalerate (A)...	4
Aniline (K).....	1.40	Cresol (K).....	5
Methyl anthranilate (E)...	1.45	Ethyl butyrate (A).....	5
Methyl butyrate (A).....	2.0	Terpineol (E).....	5
Vanillin (G).....	2.0	Chloroform (A).....	6
Citronellol (E).....	2.30	Ethyl succinate.....	6
Eucalyptol (C).....	2.30	Anethol (C).....	6.30
Isobutyl alcohol (K).....	2.30	Linalyl acetate (D).....	7

ODORIMETRY

The olfact of an odor is the threshold or minimum perceptible concentration expressed in gms per cc which multiplied by $6.06 \times 10^{21}/M$, where M is the molecular weight, gives molecules per cc.

The authorities quoted are: Backman (1); Berthelot (2); Fischer and Peuzoldt (3); Henning (4); Hermanides (5); Huyer (6); Ohma (7); Passy (8); Tempelaar (9); van Wartenberg (10); Zwaardemaker (11).

Compound		Molecules per cc = $A \cdot 10^z$		Author-ity
Name	Formula	A	z	
Ionone (F).....	$C_{15}H_{20}O$	{ 16 32	{ 5 5	{ 4 9
Ethyl bisulfide (I).....	C_4H_8S	15	6	9
Scatole (N).....	C_9H_8N	{ 16 18	{ 6 6	{ 5 9
Vanillin (G).....	$C_8H_8O_2$	20	6	8
Trinitroisobutyltoluene (H).....	$C_{11}H_{12}N_3O_6$	21	6	9
Coumarin (G).....	$C_9H_6O_2$	33	6	9
Citral (D).....	$C_{10}H_{16}O$	40	6	8
Valeric acid (L).....	$C_5H_{10}O_2$	47	6	4
Butyric acid (L).....	$C_4H_8O_2$	69	6	8
Isoamyl alcohol (K).....	$C_5H_{12}O$	69	6	8
Vanillin (G).....	$C_8H_8O_2$	72	6	9
Valeric acid (D).....	$C_5H_{10}O_2$	12	7	9
Heptylic acid (C).....	$C_7H_{14}O_2$	16	7	8
Guaiacol (K).....	$C_7H_8O_2$	{ 18 20	{ 7 7	{ 5 9
Citral (D).....	$C_{10}H_{16}O$	20	7	8
Methyl anthranilate (E).....	$C_8H_8NO_2$	24	7	9
Nitrobenzene (B).....	$C_6H_5NO_2$	32	7	4
Heliotropine (F).....	$C_8H_8O_2$	40	7	4
Coumarin (G).....	$C_9H_6O_2$	41	7	8
Iodoform.....	CHI_3	42	7	2
Bromoform.....	$CHBr_3$	48	7	8
Osmium tetroxide.....	OsO_4	48	7	10
Oenanthyl alcohol (C).....	$C_7H_{14}O$	52	7	8
Valeric acid (D).....	$C_5H_{10}O_2$	59	7	8
Cinnamaldehyde (C).....	C_9H_8O	64	7	9
Nonylic acid (E).....	$C_9H_{18}O_2$	77	7	8
Isobutyl alcohol.....	$C_4H_{10}O$	82	7	8
Thymol (C).....	$C_{10}H_{14}O$	15	8	9
Capric acid (L).....	$C_{10}H_{20}O_2$	18	8	8
Heliotropine (F).....	$C_8H_8O_2$	20	8	8
Nitrobenzene (B).....	$C_6H_5NO_2$	{ 20 20	{ 8 8	{ 5 9
Borneol (C).....	$C_{10}H_{18}O$	20	8	9
Coumarin (G).....	$C_9H_6O_2$	21	8	8
Eucalyptol (C).....	$C_{10}H_{18}O$	22	8	9
Citral (D).....	$C_{10}H_{16}O$	25	8	9
Linalyl acetate (D).....	$C_{12}H_{20}O_2$	29	8	9
Lauric acid (C).....	$C_{12}H_{24}O_2$	30	8	8
Pyridine (M).....	C_5H_5N	31	8	9
Pulegon (M).....	$C_{10}H_{16}O$	33	8	9
Eucalyptol (C).....	$C_{10}H_{18}O$	39	8	7
Heliotropine (F).....	$C_8H_8O_2$	40	8	8
Carvacrol (C).....	$C_{10}H_{14}O$	40	8	9
Propionic acid.....	$C_3H_6O_2$	41	8	8

Compound		Molecules per cc = $A \cdot 10^z$		Author-ity
Name	Formula	A	z	
Durol (K).....	$C_{10}H_{14}$	41	8	1
Isoamyl acetate (A).....	$C_7H_{14}O_2$	{ 42 42	{ 8 8	{ 5 9
Safrol (C).....	$C_{10}H_{10}O_2$	48	8	7
Citral (D).....	$C_{10}H_{16}O$	52	8	7
Anethol (C).....	$C_{10}H_{12}O$	57	8	9
Methyl butyrate (A).....	$C_8H_{16}O_2$	58	8	9
Terpineol (E).....	$C_{10}H_{18}O$	79	8	9
Eugenol (C).....	$C_{10}H_{12}O_2$	85	8	7
Pseudocumene (K).....	C_9H_{12}	10	9	1
Bornyl acetate (C).....	$C_{12}H_{20}O_2$	14	9	9
Methylheptenone (A).....	$C_8H_{12}O$	15	9	9
Ethyl butyrate (A).....	$C_8H_{16}O_2$	15	9	9
Methyl acetate (A).....	$C_4H_8O_2$	16	9	11
Carvone (C).....	$C_{10}H_{14}O$	22	9	9
Caproic acid (L).....	$C_6H_{12}O_2$	27	9	8
Ethyl succinate (A).....	$C_8H_{14}O_4$	28	9	9
Methyl salicylate (C).....	$C_9H_{10}O_2$	39	9	9
Xylene (K).....	C_8H_{10}	46	9	1
Cresol (K).....	C_7H_8O	50	9	9
Methylnonyl ketone (C).....	$C_{11}H_{22}O$	61	9	9
Ethyl ether (A).....	$C_4H_{10}O$	61	9	4
Aniline (K).....	C_6H_7N	63	9	9
Camphor (C).....	$C_{15}H_{16}O$	64	9	8
Amyl alcohol (K).....	$C_5H_{12}O$	69	9	8
Safrol (C).....	$C_{10}H_{10}O_2$	75	9	9
Phenol (K).....	C_6H_6O	77	9	4
Butyl alcohol (K).....	$C_4H_{10}O$	82	9	8
Ethyl ether (A).....	$C_4H_{10}O$	82	9	8
Fenchone (C).....	$C_{10}H_{16}O$	92	9	9
Acetaldehyde (A).....	C_2H_4O	96	9	9
Citronellol (E).....	$C_{10}H_{20}O$	11	10	9
Valeric acid (L).....	$C_5H_{10}O_2$	12	10	5
Toluene (K).....	C_7H_8	13	10	1
Ethyl isovalerate (A).....	$C_7H_{14}O_2$	21	10	9
Trimethylamine (J).....	C_3H_9N	22	10	9
Phenol (K).....	C_6H_6O	26	10	9
Benzene (K).....	C_6H_6	41	10	1
Acetone (A).....	C_3H_6O	42	10	11
Acetic acid (L).....	$C_2H_4O_2$	50	10	8
Propyl alcohol (K).....	C_3H_8O	51	10	8
Acetic acid (L).....	$C_2H_4O_2$	71	10	9
Toluidine (K).....	C_7H_7N	79	10	6
Xylidine (K).....	$C_8H_{11}N$	10	11	6
Toluidine (K).....	C_7H_7N	{ 15 16	{ 11 11	{ 6 6
Menthol (C).....	$C_{10}H_{20}O$	26	11	9
Aniline (K).....	C_6H_7N	30	11	6
Formic acid.....	CH_2O_2	33	11	8
Terpineol (E).....	$C_{10}H_{18}O$	73	11	5
Pyridine (M).....	C_5H_5N	12	12	5
Ethyl alcohol (A).....	C_2H_6O	{ 24 33	{ 12 12	{ 4 4
Formic acid.....	CH_2O_2	84	12	9
Methyl alcohol.....	CH_4O	11	13	9
Methyl alcohol.....	CH_4O	19	13	8
Apiol (C).....	$C_{15}H_{14}O_4$	17	15	9

VALUE OF AN OLFACTY EXPRESSED AS DEGREE OF SATURATION
OF AIR WITH THE ODORIVECTOR

Substance	% Saturation	Substance	% Saturation
Eucalyptol	0.058	Methyl alcohol.....	1.388
Eugenol	0.144	Toluidine.....	1.515
Toluene	0.158	Ethyl alcohol.....	2.5
Benzene	0.169		

VALUE OF AN OLFACTY IN CM OF THE ZWAARDEMAKER
OLFACTOMETER

The constants of Zwaardemaker olfactometer are: width of cylinder, 0.8 cm; length, 10 cm; contents, 50 cc; air contact per cc of cylinder, 2.5 cm²; velocity of air in the air tube, 100 cc per sec (exposure, 0.33 sec).

MINIMUM PERCEPTIBLE IN CM OF OLFACTOMETER SCALE
Saturated solutions (9)

Substance	cm	Substance	cm
Terpineol—H ₂ O.....	0.01	Caproic acid—H ₂ O.....	0.10
Ethyl propionate—H ₂ O.....	0.02	Trinitroisobutyltoluene— H ₂ O.....	0.10
Ionone—H ₂ O.....	0.02	Guaiacol—H ₂ O.....	0.20
Camphor—H ₂ O.....	0.07	Trimethylamine—Paraffin	0.20

Aqueous solutions (10)

Substance	Concentration Wt. %	cm
Pyridine	0.05	0.1
Ethyl disulfide	0.02	0.5
Citral	0.01	0.2

Aqueous solutions (10).—(Continued)

Substance	Concentration Wt. %	cm
Scatole	0.01	0.4
Valeric acid	0.01	0.5
Isoamyl acetate	0.01	0.7
Guaiacol	0.0007	1.0

Paraffin solutions (11)

Substance	Concentration Wt. %	cm	Substance	Concentration Wt. %	cm
Borneol.....	1.0	0.001	Citral.....	1.0	0.09
Cadaverine.....	0.1	0.001	Isoamyl acetate.....	0.5	0.29
Scatole.....	0.1	0.002	Guaiacol.....	0.1	0.62
Ethyl sulfide.....	0.01	0.01	Ionone.....	0.0004	0.62
Pyridine.....	1.0	0.03	Safrol.....	3.0	1.12
Valeric acid.....	0.01	0.04	Terpineol.....	2.5	1.60
Nitrobenzene.....	5.0	0.06			

LITERATURE

(For a key to the periodicals see end of volume)

- (1) Allison and Katz, 45, 11: 336; 19. (2) Backman, 278, 168: 351; 17. (3) Henning, *Der Geruch*, 1924. (4) Hermanides, *Thesis, Utrecht*, 1907. (5) Heyninx, *Thesis, Brussels*, 1919. (6) Huyer, *Thesis, Utrecht*, 1917. (7) Tempelaar, *Thesis, Utrecht*, 1913. (8) Zwaardemaker, *Physiol. des Geruchs*, 1898: 247. (9) Zwaardemaker, *Arch. Anat. Physiol., Physiol. Abt.*, 1903: 48. (10) Zwaardemaker, *In Abderhalden, Handb. biol. Arbeit.* 5, pt. 7: 455; 23. (11) Zwaardemaker, *In Tigerstedt, Handb. Physiol.* 3, pt. 1: 49; 14. (12) Zwaardemaker, *Arch. Neerl. Physiol.*, 1: 347; 17.

RADIOACTIVITY

S. C. LIND, SPECIAL EDITOR

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1923 INTERNATIONAL TABLE RADIOACTIVE ELEMENTS AND THEIR CONSTANTS

λ (sec)⁻¹ is the radioactive constant of transformation.

$$dQ = -\lambda Q dt, \quad Q = Q_0 e^{-\lambda t}, \quad \log_{10} \frac{Q_0}{Q} = 0.4343 \lambda t,$$

in which Q_0 is the initial quantity and Q the quantity remaining after a time t (seconds).

$\lambda = -\frac{dQ}{Q} \frac{1}{dt}$ represents the fraction of the element transformed, reduced to the unit of time.

In the case of a double transformation, the values between brackets [] refer to the constants corresponding with the separate branches; the constant for both branches not being put between brackets.

The sign (?) indicates that the value has been indirectly deduced from the range of the α -rays expelled.

$\theta = \frac{1}{\lambda}$ is the average life of the radioactive atoms.

T is the half period, i.e., the time in which the quantity of radioelement is diminished to one half:

$$\lambda T = -\log_e 0.5 = 0.69315 \text{ and } \theta = 1.443 T$$

Radiation.—The brackets () indicate that the radiation is relatively feeble.

REMARKS CONCERNING THE NOMENCLATURE

It is desirable that the nomenclature adopted by the international commission should be accepted universally but that now put forward for the present year is provisional, to serve as a basis of discussion with the view to the adoption ultimately of a standard nomenclature.

The most important points are:

1. The three radioactive emanations have been given the names radon, actinon, and thoron, with the symbols Rn, An, Tn, to suggest both their origin and their chemical character as members of the family of the rare gases of which the valency is zero;
2. In the branches which occur at the C members the sign (') has been used to indicate the products resulting from the emission of β -rays (isotopes of polonium) and the sign (") to indicate the products resulting from the emission of α -rays (isotopes of thallium);
3. The ultimate products have been indicated by the letter Ω .

EXPLANATION OF THE NOTES

NOTE 1.—*Uranium I*.—The value given for θ is that obtained from the equation:

$$\theta = \frac{1}{\lambda} = 2440 \times 0.97 \times 3 \times 10^6 \times \frac{226}{238} = 6.75 \times 10^9$$

in which the number 2440 represents the average life of radium in years, the number 0.97 the branching coefficient and $3 \times 10^6 \times \frac{226}{238}$ is the ratio between the numbers of atoms of uranium and radium in equilibrium in minerals.

If the actinium series is independent from that of uranium I, λ cannot be calculated by this method.

The value of λ obtained by the direct counting of the α -particles from a compound of uranium is 4.57×10^{-18} from which $\theta = 7 \times 10^9$ years and $T = 4.8 \times 10^9$ years.

NOTE 2.—*Uranium X₂* is also called brevium.

NOTE 3.—Radon replaces the names *radium emanation* and *niton* (the latter of which was proposed by Sir William Ramsay).

NOTE 4.—*Radium C* undergoes a double disintegration: 99.97% of the atoms emit β -rays and produce the substance Ra-C' which gives α -rays, and 0.03% of the atoms emit α -rays and produce the substance Ra-C'' which gives β -rays.

a_0 is the range in cm of the α -rays in air at 0°C and a pressure of 760 mm of mercury.

The range at t° C. and under p mm of mercury is

$$a = \frac{a_0(273 + t)760}{273p}$$

V is the velocity of α or β -rays relatively to that of light.

To convert to cm per sec multiply by 3×10^{10} .

For the α -rays:

$$V = 0.0342 a^{1/4}$$

$\mu_{\beta Al}$ is the absorption coefficient of the β -rays in aluminium, the thickness being measured in cm.

$\mu_{\gamma Al}$ and $\mu_{\gamma Pb}$ are the absorption coefficients of the γ -rays in aluminium and lead respectively, the thickness being measured in cm; the latter is only given for the most penetrating type of γ -rays.

If I_0 is the initial intensity and I the intensity after the rays have traversed x cm of the absorbent:

$$I = I_0 e^{-\mu x} \quad \log_{10} \frac{I_0}{I} = 0.4343 \mu x$$

If D is the thickness corresponding with the absorption of one-half of the rays:

$$\mu D = 0.693$$

NOTE 5.—*Radium D* is also called radiolead.

NOTE 6.—*Radium C''* is also called radium C₃.

NOTE 7.—*Uranium Y* is the first known member of the actinium series. It may be derived from Uranium I or Uranium II. In this case, 3% of the atoms of Uranium produce the actinium family, and 97% the radium family.

The hypothesis has also been put forward that the actinium series may be produced independently from a third (hypothetical) isotope of Uranium for which the name actinouranium has been proposed.

NOTE 8.—*Protoactinium* is also called eka-tantalum.

NOTE 9.—A new radioactive substance named uranium Z, and isotopic with protoactinium, accompanies uranium in minute quantity. (25, 54B: 1131; 21). Its period is from 6 to 7 hours. It emits a β -radiation for which D_{Al} varies from: 0.0014 to 0.012. Its parent is an isotope of thorium, but it cannot yet be placed in the series.

NOTE 10.—*Actinon* is also called actinium emanation.

NOTE 11.—*Actinium C*. 0.2% of the α -rays emitted by this substance have a range $a_0 = 6.10$, instead of 5.12. From this it has been concluded that 0.2% of the atoms undergo a transformation by the emission of β -rays as is the case in the radium C and thorium C branches (3, 27: 690; 14, 28: 818; 14). Confirmatory evidence appears to be desirable.

NOTE 12.—*Actinium C''* is also called actinium D.

NOTE 13.—*Thorium*. The value given for λ is that obtained from the direct counting of the α -particles emitted by a compound of thorium. All the other values are less; the smallest being 0.55 of that given in the table and giving $\theta = 3.45 \times 10^{10}$ years and $T = 2.37 \times 10^{10}$ years (63, 19: 259; 18).

NOTE 14.—*Thoron* is also called thorium emanation.

NOTE 15.—*Thorium C* undergoes a double disintegration: 65% of the atoms emit β -rays and produce the substance Th-C' which gives α -rays, and 35% emit α -rays and produce the substance Th-C'' which gives β -rays.

NOTE 16.—*Thorium C*. The value $a_0 = 4.69$ is that corresponding with $V = 0.0572$ which has been directly measured.

NOTE 17.—*Thorium C''* is also called thorium D.

NOTE 18.—*Potassium* and *rubidium* emit β -rays but show no other evidence of radioactivity.

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PHYSICAL PROPERTIES OF THE RADIOELEMENTS AND THEIR COMPOUNDS (Except Ra, Th, U and Rn)

GEORG HEVESY

1. Atomic Weights.—Io (mixture of Io + Th), 231.51 (2). RaΩ (= U-Pb), 206.04 (2). ThΩ (= Th-Pb), 207.97.
2. Molecular Weights.—An (= Ac-Em), 220-232 (4). Tn (= Th-Em), 201-210 (4). Rate of effusion method.
3. Density (5).—RaΩ, 11.273 g cm⁻³ at 19.94°C.
4. Melting Point (26).—RaΩ', differs from Pb < 0.05°.
5. Boiling Point (32).—Ra-FH₃, 37°C.
6. Solubility.—S = solubility mol l⁻¹. $\alpha' = \frac{C_{\text{Air}}}{C_{\text{H}_2\text{O}}}$. An (14),

$\alpha' = 2$ at 18°. Tn (15), $\alpha' = 1$ at 18°. Rn (16). S = 1.7989 (15b) in H₂O at 25°. S [RaΩ'(NO₃)₃] - S[Pb(NO₃)₂] < 10⁻⁴.

RELATIVE SOLUBILITY OF AN IN DIFFERENT SOLVENTS AT 18°

H ₂ O	Sat. KCl soln.	Conc. H ₂ SO ₄	C ₂ H ₅ OH	C ₃ H ₇ OH	C ₆ H ₅ CHO	C ₆ H ₆	C ₆ H ₅ CH ₃	Kerosene	CS ₂
1	0.9	0.95	1.11	1.6	1.7	1.7	1.8	1.9	2.1

7. Rate of Solution.

PERCENT DISSOLVED FROM SURFACE AT 18°

By H ₂ SO ₄ in 15 sec (17)							
H ₂ SO ₄ , equiv. per liter =		10 ⁻³	10 ⁻²	10 ⁻¹	1		
Ra-B from glass.....		80	80	97	88		
Ra-C from glass.....		28	60	88	99		
By HNO ₃ in 60 sec (18)							
HNO ₃ , equiv. per liter =	0	10 ⁻⁵	10 ⁻⁴	10 ⁻³	10 ⁻²	10 ⁻¹	1
Th-B from quartz.....	60	61	60	80	81	83	84
Th-C from quartz.....	37	38	35	61	72	77	87

PERCENT RA-B AND RA-C DISSOLVED FROM GLASS SURFACE (17)

By H ₂ O in 5 min						
t	Ra-B	Ra-C	t	Ra-B	Ra-C	
0°	0.29	0.19	42°	0.78	0.67	
17°	0.47	0.35	70°	0.97	0.91	
By H ₂ SO ₄ in 15 sec						
t	Ra-B	Ra-C	t	Ra-B	Ra-C	
0°	0.74	0.52	42°	0.895	0.71	
17°	0.80	0.60	70°	0.96	0.81	

8. Adsorption.—Ratio of molal conc. in gas at equilibrium to moles adsorbed per liter of charcoal at 18°, An (19) 0.05, Tn (20) 0.02. Percent of initial amount present (per 50 cc of solution) adsorbed by 1 g of adsorbent (21). (a) By BaSO₄, from 0.1 N HCl, Th-B 81, Th-C 32; from 0.1 N KOH, Th-B 20, Th-C 64; from 0.1 N NH₃, Th-B 100, Th-C 86. (b) By Cr₂O₃, from 0.1 N HCl, Th-B 2.5, Th-C 69. (c) By AgBr, from 0.1 N HBr, Th-B 81, Th-C 34. (d) By BaSO₄, from 1 N HCl, Ra 80. (e) By Cr₂O₃, from 1 N HCl, Ra 0. (f) By AgCl, from 1 N HCl, Ra 0.
9. Vapor Pressure.— p_{700° for RaΩ' is 2% greater than for Pb (22).

10. Temperature of Volatilization.—Depends on nature of surface and chemical state of the radioactive element. v. (23, 24, 25).

11. Coefficient of Diffusion.

(a) IN GASES AT 76 CM AND 15°

An, in.....	Air	H ₂	CO ₂	SO ₂	A
Δ, cm ² sec ⁻¹	0.098-0.123 (6, 7, 8, 9)	0.330 (7)	0.412 (8)	0.075 (7, 8)	0.062 (7)
0.107					
Tn, in.....	Air	A			
Δ, cm ² sec ⁻¹	0.085-0.103 (6, 7, 9)	0.084 (7)			

(b) THE CATIONS IN WATER (10) AT 18°

Ion	UX ₁ ⁺⁺	Io ⁺⁺	Ra-D ⁺⁺	Ra-E ⁺⁺⁺	Ra-F ⁺⁺	Ac ⁺⁺⁺
Δ, cm ⁻² day ⁻¹ ...	0.4	0.33	0.65	0.45	0.76	0.46
Ion	AcX ⁺⁺	Rd-Th ⁺⁺	ThX ⁺⁺	Th-B ⁺⁺	Th-C ⁺⁺⁺	
Δ, cm ⁻² day ⁻¹	0.69	0.33	0.66	0.67	0.5	

Th-CCl₃ in $\frac{1}{2}$ N NH₃, Δ = 0.37. Ra-FCl₃ in $\frac{1}{2}$ N NH₃, Δ = 0.19.

(c) IN METALS. Δ IN CM² DAY⁻¹

	t	Δ
Th-B in Pb.....	343°	2.2 (11)
Ra-D in Pb.....	280°	< 10 ⁻⁴ (12)
Ra-F in Pb.....	280°	< 10 ⁻⁴ (12)
Ra-F in Au.....	470°	ca. 10 ⁻⁵ (13)
Ra-B + Ra-C in Ag.....	470°	3.8 × 10 ⁻⁷ (13)
Ra-B in Au.....	470°	8.2 × 10 ⁻⁷
Ra-B in Pt.....	470°	3.4 × 10 ⁻⁷

In re diffusion of Th-B in single crystals, in lead foils and in thallium foils v. (35).

12. Refractive Index (27).— n_D^{20} for cryst. RaΩ'(NO₃)₃ = 1.7814.

13. X-ray Spectra.—All lines of the L series and the Mα and Mβ lines of RaΩ' differ by less than 5 × 10⁻¹² cm from the same lines for Pb (28).

14. Relative Ionic Mobilities (10).—In capillary tubes by comparison against Ra (A = 57.3 mhos).

Cation.....	Ra	Ra-C	Ra-D	Ra-E	Ra-F	AcX	ThX	Th-B	Th-C
A	57.3	54.5	61.9	61.9	68.8	56.1	58.0	55.4	54.0

15. Emf.—RaΩ' / N RaΩ'(NO₃)₃ // N Pb(NO₃)₂ / Pb. < 0.1 millivolt (31).

16. Deposition Voltage.—From $\frac{1}{10}$ N HNO₃ containing 10⁻¹ mole Ra-F, cathodic deposition occurs on Au electrodes at E_{Hg} = 0.35 volt, anodic at E_{Hg} = 1.05 volt (30).

LITERATURE AND REMARKS

(For the key to periodicals see end of volume)

- (1) Hönigschmid, 9, 22: 21; 16. This mixture contained about 30% Io and 70% Th and was probably contaminated with some Th not present in the pure pitchblende (cf. Soddy and Hitchens, 3, 47: 1148; 24. Meyer and Ulrich, 75, 122: 279; 23). (2) Lowest value found. Higher values probably due to presence of lead. Richards and Lambert, 1, 26: 1329; 14, 95, 68: 429; 14. Hönigschmid and Horowitz, 75, 122: 2407; 14, 9, 26: 319; 14. Curie, 34, 143: 1676; 14, 198, 34: 586; 23. Richards, Ann. Rep. Smithsonian Inst. 1918: 205. Richards and Putseys, 1, 45: 2934; 23. (3) Highest value found. Lower values probably due to presence of lead and RaΩ. Hönigschmid, 9, 25: 91; 19. Soddy, 4, 106: 1402; 14, 58, 94: 615; 15, 98: 469; 17, 99: 244; 17. (4) Leslie, 4, 24: 637; 12, 34,

- 158: 328; 11. Marsden and Wood, 4, 26: 948; 13. (9) Richards and Wadsworth, 1, 28: 221, 1658; 16. Cf. Soddy, 58, 107: 41; 21. Egerton and Lee, 5, 103: 487; 23. (9) Rutherford, "Radioactivity," Cambridge, 1913, p. 387. (7) Russ, 4, 17: 540; 09. (8) B. Bruhat, 199, 6: 67; 09. Cf. Debiere, 199, 4: 213; 07. McLennan, 2, 30: 660; 10. Eckmann, 200, 9: 177; 12. Thomsen, 201, 15: 377; 09. Hevesy, 200, 10: 198; 13. (9) Leslie, 34, 153: 328; 11. Rutherford, l.c.
- (10) Hevesy, 63, 14: 49, 1202; 13. 4, 26: 586; 14. Paneth, 75, 123: 1636; 13. The radioelements probably present in colloidal state. (11) Gr6h and Hevesy, 8, 63: 85; 20. Diffusion rate of a mixture of Th-B and Pb in lead. Th-B used as indicator. (12) Gr6h and Hevesy, 8, 65: 216; 21. Diffusion rate of a mixture of Ra-D and Pb in lead. (13) Wertenstein and Dobrowolska, 51, 4: 324; 23. Diffusion rate of active deposit (probably of oxides). (14) Hevesy, 63, 12: 1214; 11. 50, 16: 429; 12. (15) Klaus, 63, 6: 820; 05. Boyle, *Macdonald Phys. Build. Bull.*, No. 1: 52; 10. α of short-lived An and Tn determined by making assumptions only partly justified. α of An and Tn probably practically identical with that of Rn. (16) Richards and Schumb, 1, 40: 1403; 18. The $Ra\Omega'$ used contained some common lead, its atomic weight being 206.34. The solubility of common lead (at. wt. 207.19) was found by the same authors to be 1.7993. Cf. Fajans and Lambert, 93, 95: 297; 16. (17) Ramstedt, 147, II: No. 31; 13. Cf. Arrhenius, 199, 7: 228; 10. Godlewski, 199, 10: 250; 13. Schr6der, 4, 24: 131; 12. Hevesy, 9, 19: 291; 13. (18) Hevesy and Rona, 7, 89: 294; 15. *In re* Ra-F, cf. Paneth and Hevesy, 75, 123: 1050; 13. (19) Hevesy, 63, 12: 9; 12. 50, 18: 429; 12.
- (20) Boyle, 4, 17: 389; 09. Ra-B and Th-B between Pb amalgam and $Hg(NO_2)_2$; cf. Z. Klemensiewicz, 34, 153: 1889; 14. (21) Paneth, 63, 15: 924;

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ARTIFICIAL DISINTEGRATION OF THE ELEMENTS

G. RUDOLF

Disintegration by the splitting off of positively charged hydrogen nuclei by the action of rapidly moving α -particles.

(a) Disintegration obtained with B, N, F, Ne, Na, Mg, Al, Si, P, S, Cl, A, K (1, 2, 3, 5).

(b) No disintegration obtained with H, He, Li, C, O, Ni, Cu, Zn, Sc, Kr, Mo, Pd, Ag, Sn, X, Au, U (2, 3, 5).

(c) Doubtful, Be (4, 5).

LITERATURE

(For a key to the periodicals see end of volume)

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RANGE OF EMITTED HYDROGEN NUCLEI (2, 3, 5)

Element	Forward range in cms	Backward range in cms
B	58	38
N	40	18
F	65	48
Na	58	36
Al	90	67
P	65	49
Mg, Si, S, Cl, A, K	18-30	
Ne	16	

The values for B, F, Na, P are possibly somewhat in error (2) but are certainly greater than 40 (2).

ELECTRON EMISSION PRODUCED BY RADIATION FROM RADIOACTIVE SUBSTANCES

PIERRE AUGER

RELATIVE IONIZATION OF GASES BY Po α -RAYS HAVING A 3.8 CM RANGE (1)

Gas	Air	O ₂	N ₂	CO ₂	Illuminating gas
<i>I</i>	1	1.12	0.97	1.23	0.38

RELATIVE MOLECULAR IONIZATION OF GASES BY β AND γ RAYS (2)

Gas	Air	H ₂	O ₂	NH ₃	N ₂ O	CO ₂	C ₂ N ₂	SO ₂	CS ₂	C ₆ H ₁₂
<i>Iβ</i>	1	0.16	1.17	0.89	1.55	1.60	1.86	2.25	3.62	4.55
<i>Iγ</i>	1	.16	1.16	.90	1.55	1.58	1.71	2.27	3.66	4.53

Gas	C ₆ H ₆	CH ₃ OH	CH ₃ Br	CHCl ₃	CH ₃ I	CCl ₄	C ₂ H ₄ O
<i>Iβ</i>	3.95	1.69	3.73	4.94	5.11	6.28	2.12
<i>Iγ</i>	3.94	1.75	3.81	4.93	5.37	6.33	2.17

Gas	C ₂ H ₅ Cl	C ₂ H ₅ Br	C ₂ H ₅ I	(C ₂ H ₅) ₂ O	Ni(CO) ₄
<i>Iβ</i>	3.24	4.41	4.39	5.90	
<i>Iγ</i>	3.19	4.63	4.29	6.47	5.98

RESIDUAL IONIZATION AS DEPENDENT ON THE PRESSURE

Ionization from the walls (a secondary radiation) in air confined for 10 days. N_I = number of ions per cm³ per sec (3).

P. atm.	0	10	20	27	40	46	50	60
N_I	0	17	30	38	46	50	50	50

NUMBER OF ELECTRONS (δ -RAYS) LIBERATED BY α -RAYS

l = thickness of metal traversed. N_E = electrons emitted per incident particle (4).

$10^4 l$ (g cm ⁻²)	In Al							In Ag		In Au	
	81	162	243	324	410	492	570	28.5	591	12.3	1223
N_E	11.9	14.2	15.0	17.2	17.8	18.9	19.4	8.12	13.76	9.82	18.16

PAIRS OF IONS PRODUCED BY α -RAYS

If R_0 cms is the range of the α -particle in air, it will produce n pairs of ions. $n = n_0 R_0^{3/2}$, where $n_0 = 6.233 \times 10^4$. Direct measurement for Ra-C' gives $n = 2.20 \times 10^5$ (5).

ENERGY

Energy of electrons (Sec. β -rays) emitted by metals subjected to the action of γ -rays from Ra(C + E). Three groups of rays (6).

Metal.....	Pb	Pt	W	U	Ba
Atomic number.....	82	78	74	92	56
Energy of the secondary rays. Volts $\times 10^{-5}$.	1.49	1.58	1.66	1.22	
	2.03	2.12	2.20	1.74	2.53
	2.60	2.69	2.76	2.31	

SECONDARY β -RAY VELOCITIES

Pb subjected to the action of γ -rays from Ra-B has been found to emit the following secondary β -rays:

$RH = \frac{mu^2}{e(1-\beta^2)} = 3610, 3250, 2990, 2735, 2225, 2130, 2000, 1935, 1825, 1750, 1620, 1560, 1400, 1240, 1150, 1010, 950, 820, 800$ (8).

ABSORPTION

Absorption of the secondary β -rays emitted by metals when subjected to the radiation from Ra(B + C). μ_h for the hard rays, μ_s for the soft rays. Absorbing screen, Al (7).

Metal.....	Ag	Al	Au	Cu	Fe	Ni	Pb
μ_h , cm ⁻¹	69	14	118	35	41	52	118
μ_s , cm ⁻¹	207	52.5	345	105	165	165	345

LITERATURE

(For a key to the periodicals see end of volume)

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ENERGY OF RADIOACTIVE PROCESSES

STEFAN MEYER

HEAT PRODUCTION OF RADIOACTIVE SUBSTANCES

Joules per hour per gram of the radioactive element and the decay products in equilibrium therewith. (1 Joule = 0.2390 g-cal.)

Substance	Rays	Meyer & Hess(4)	Hess(2)	Rutherford & Robinson (7)
Ra.....	α and recoil	573	105.5	
Rn.....	α and recoil			105.0
Ra-A.....	α and recoil		467.7	119.7
Ra-B + Ra-C.....	α and recoil and β , γ			127.6 211.3
Total.....		573	573	565

Substance	Heat	Lit.
Th.....	10.0×10^{-5}	(8)
U.....	4.2×10^{-4}	(8)
Pitchblende (ca. 64% U).....	27.2×10^{-5}	(8)

Ellis and Wooster (1) have determined the γ -heat effect of Ra-B to be 3.6; Ra-C, 32.2; total, 36 joules/h. Calculations of the heat effect of β - α and γ -rays have been made by Meitner (3) and Thibaud (8).

LITERATURE

(For a key to the periodicals see end of volume)

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CHEMICAL EFFECTS OF α -PARTICLES

S. C. LIND AND D. C. BARDWELL

M is the total number of molecules reacting (on the left hand of the equation, first column); N is the total number of ion pairs produced in the reactants by α -particles.

$$\frac{M}{N} = \frac{\left(\frac{k\mu}{\lambda}\right)' \cdot V}{D \cdot F \cdot G \cdot H} \times 1.66 \times 10^4$$

V = volume in cm³ of, and D = diameter in cm of, the reaction sphere.

F = average intensity of ionization (1). G = specific molecular ionization (air = 1).

$H = (\alpha + R)/\alpha$ where α and R are α -ray and recoil atom effects resp. (2).

$$\left(\frac{k\mu}{\lambda}\right)' = \left(\ln \frac{P_1}{P_2}\right) + [E_0(e^{-\lambda t_1} - e^{-\lambda t_2})] \quad (3)$$

where E_0 = initial radon (in curies), P = pressure (mm Hg), λ = decay constant of radon (in reciprocal days) and t = time (in days).

Where the quantity of gas in the reaction vessel at atmospheric pressure exceeds the air equivalent of a bulb 2.5 cm in diameter, the ionization is calculated by equations developed by W. Mund (17), slightly modified:¹

¹ The modified equation is derived by correcting the integration of Mund's function $\varphi(r) = \int_0^{2R} (r-x)^{3/2} x^2 dx$ (equation 5, p. 340). In the large bulbs used by Mund no error was introduced by employing his equation since $2R > r$.

$$I = N_0 (1 - e^{-\lambda t}) k \left[r^{3/2} + \frac{1}{2} r'^{3/2} + \frac{1}{2} r''^{3/2} - \frac{3}{20R} \left\{ 3r^{3/2} + r'^{3/2} + r''^{3/2} - 3(r-2R)^{3/2} - (r'-2R)^{3/2} - (r''-2R)^{3/2} \right\} + \frac{81r^{1/2}}{3520R^3} - \frac{27}{160} (r-2R)^{3/2} \left\{ \left(\frac{r-2R}{R}\right)^2 + \frac{3}{22} \left(\frac{r-2R}{R}\right)^3 \right\} \right]$$

I = Number of ions produced by the three sets of α -particles in the time t .

N_0 = Number of atoms of radon present initially ($t = 0$) (1 curie = 1.772×10^{16} atoms Rn)

R = Radius of reaction bulb in cms.

λ = Decay constant of radon (as above)

$k = 6.67 \times 10^4 \frac{\text{ions}}{\text{cm}^2} =$ ionization constant per α -particle as a function of the range (5); $i = kr^{3/2}$ or $kr'^{3/2}$ or $kr''^{3/2}$ for Rn, Ra-A, and Ra-C, resp. (air at 760 mm and 0°C)

r, r', r'' = ranges of α -particles from Rn, Ra-A, and Ra-C, resp. Wourzel's (13) M/N values are recalculated by the Mund equation

The values adopted for the number of α -particles per sec per g of radium, and the total ions from one α -particle of Ra-C in its completed path in air are respectively, for column (a) 3.72×10^{10} (4) and 2.37×10^6 (8), and for (b) 3.40×10^{10} (6, 7) and 2.20×10^6 (8). Other combinations of these numbers give intermediate values of M/N .

Reaction <i>l</i> = liquid, <i>g</i> = gas, <i>s</i> = solid	$\frac{M}{N}$		Lit.
	(a)	(b)	
$2H_2g + O_2g \rightarrow 2H_2Ol$	5.13	6.05	(9, 10)
Dry or moist; at 25°C to -75°C			
$2H_2Ol \rightarrow 2H_2g + O_2g$	0.86	1.01	(11)
	1.05	1.24	(11)
$2H_2Og \rightarrow 2H_2g + O_2g$	<0.01	<0.01	(11)
$2H_2Os \rightarrow 2H_2g + O_2g$	0.05	0.06	(11)
$CO_2g \rightarrow 1\%$ disappearance of gas, no decomposition products.....	5×10^{-3}	6×10^{-3}	(18)
$COg \rightarrow CO_2g + C_nOm + Cs$	1.85	2.18	(18)
$2COg + O_2g \rightarrow 2CO_2g$ at room temperature.....	5.7	6.7	(18)
$2COg + O_2g \rightarrow 2CO_2s$ at liquid air temp.	>3.1	>3.7	(18)
$COg + H_2g \rightarrow$ carbohydrate <i>s</i>	3.13	3.7	(18)
$CO_2g + H_2g \rightarrow$ carbohydrate <i>s</i> + H_2Ol	1.44	1.70	(18)
$CO_2g + CH_4g \rightarrow$ carbohydrate <i>s</i> + H_2Ol	0.76	0.90	(10)
$CH_4g \rightarrow H_2g +$ hydrocarbons <i>g, l</i> and <i>s</i> ..	2.0	2.4	(10)
$C_2H_4g \rightarrow H_2g +$ hydrocarbons <i>g, l</i> and <i>s</i> ..	1.7	2.0	(10)
$C_2H_2g \rightarrow H_2g +$ hydrocarbons <i>g, l</i> and <i>s</i> ..	1.5	1.8	(10)
$C_2H_4g + H_2g \rightarrow$ hydrocarbons <i>g, l</i> and <i>s</i> ..	1.4	1.6	(10)
$CH_4g + 2O_2g \rightarrow CO_2g + H_2Ol$	4.4	5.2	(10)
$CH_4g + 2O_2g + [1 \text{ mol } \% (C_2H_2)_2Se] \rightarrow CO_2g + H_2Ol$	5.7	6.7	(10)
$2C_2H_2g + 7O_2g \rightarrow CO_2g + H_2Ol$	6.8	8.0	(10)
$(CN)_2g \rightarrow \begin{cases} 5\% \text{ to } N_2g \text{ and } Cs. \\ 95\% \text{ to paracyanogen } s. \end{cases}$	7.8	9.2	(12)
$2NH_3g \rightarrow N_2g \text{ and } 3H_2g$	18° 1.01 25° 1.0 108° 2.0 220° 2.92 315° 3.15	1.19 1.2 2.35 3.44 3.80	(13) (10) (13) (13) (13)
$H_2Sg \rightarrow H_2g + Ss$	18° 3.40 95° 2.80 220° 2.38	4.00 3.30 2.80	(13) (13) (13)
$H_2Ss \rightarrow H_2g + Ss$	-190° 3.?	4.?	(13)
$N_2Og \rightarrow \begin{cases} N_2g + O_2g \\ N_2g + NOg \end{cases}$	-78° 2.74 18° 2.21 220° 2.95	3.23 2.61 3.48	(13) (13) (13)
$H_2g + Cl_2g \rightarrow 2HClg$	4000	4700	(14)
$2HClg \rightarrow H_2g + Cl_2g$	0.76	0.90	(15)
$H_2g + Br_2g \rightarrow 2HBr$	1.24	1.46	(10)
$2HBr \rightarrow H_2g + Br_2g$	0.54	0.64	(16)
$2HBr \rightarrow H_2g + Br_2g$	2.6	3.1	(16)
KI in acid soln. \rightarrow free I.....	0.76	0.90	(16)

Reaction <i>l</i> = liquid, <i>g</i> = gas, <i>s</i> = solid	$\frac{M}{N}$		Lit.
	(a)	(b)	
$xHCN \rightarrow (HCN)_xs + 5\% N_2g$	10.5	12.4	(12)
$C_2N_2g + O_2g \rightarrow \begin{cases} 63\% \rightarrow (CNO)_ss \\ 37\% \rightarrow CO_2g + N_2g \end{cases}$	7.2	8.5	(10)
$C_2N_2g + \begin{cases} 67\% C_2N_2 \rightarrow (HCN)_ss \\ H_2g \rightarrow 33\% C_2N_2 \rightarrow (C_2N_2)ss \end{cases}$	6.8	8.0	(10)
$C_2H_4g \rightarrow H_2g +$ hydrocarbons <i>g, l</i> and <i>s</i>	5.0	5.9	(10)
$C_2H_2g \rightarrow (C_2H_2)_ss + 2\% H_2g$	19.5	23.0	(10)
$C_2H_2g \rightarrow (C_2H_2)_ss + 1 + \% H_2g$	20.5	24.2	(19)
$C_2H_2g + H_2g \rightarrow (C_2H_2)_ss$ (11% H_2 reacted).....	19.6	23.1	(10)

Catalytic Effect of Inert Gases (10, 20, 21)

The $-M/N$ values in the table below give the total number of molecules of reactants disappearing for each ion pair of both catalyst and reactants. Example: $\frac{M_{C_2H_2}}{N(C_2H_2 + N_2)} = 18.7$, means that 18.7 molecules of C_2H_2 polymerize to $(C_2H_2)_ss$ for each ion pair whether formed in the reactant or in the catalyst. With the increasing ratio of catalyst to reactant, a decrease in the $-M/N$ is indicated—probably attributable to exhaustion effects. Values by the (a) method only are given.

Reactants	Catalysts							
	Pure gas	N_2	H	Ne	A	Xe	CO_2	H_2
C_2H_2	19.5	18.7	20.1	19.6	18.2	18.5	17.4	19.6
		to	to	to	to			
C_2N_2	7.2	7.2	17.0	16.3	15.0	7.2		reacts
HCN.....	10.8	10.0				10.0		
$2H_2 + O_2$	5.13	5.0						reacts
$2CO + O_2$	5.7				3.9			none

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(For a key to the periodicals see end of volume)

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SATURATION CURRENT. ABSORPTION IN LIQUIDS AND SOLIDS

STEFAN MEYER

SATURATION CURRENT AND NUMBER OF IONS FOR α -RADIATORS

The saturation current is $I_s = Zke$ where Z = number of α -particles per sec per unit mass, k = number of ion-pairs per α -particle and $e = 4.774 \times 10^{-10}$ es.

Number of Ions, k

Based on the values of $Ra-C'$ and the following alternative Z values for 1 g of Ra : (a) $Z_{Ra} = 3.72 \times 10^{10}$ (19, 25); (b) $Z_{Ra} = 3.45 \times 10^{10}$ (12).

$$k = A \times 10^5 \text{ (9, 11, 13, 18, 45, 47)}$$

Element	A		Element	A	
	(a)	(b)		(a)	(b)
U _I	1.16	1.25	An.....	1.95	2.10
U _{II}	1.27	1.37	Ac-A.....	2.12	2.28
Io.....	1.31	1.41	Ac-C.....	1.88	2.03
Ra.....	1.36	1.47	Ac-C'.....	(2.09?)	(2.25?)
Rn.....	1.55	1.67	Th.....	1.23	1.32
Ra-A.....	1.77	1.83	Rd-Th.....	1.53	1.64
Ra-C.....	(1.47?)	(1.58?)	Th-X.....	1.61	1.73
Ra-C'.....	2.20*	2.37*	Tn.....	1.78	1.92
Po.....	1.50	1.62	Th-A.....	1.92	2.07
Pa.....	1.44	1.55	Th-C.....	1.71	1.85
Rd-Ac.....	1.69	1.82	Th-C'.....	2.54	2.73
AcX.....	1.61	1.74			

* Basic values.

The value of $Z_U = Z_{U_I} + U_{II}$ may be obtained from Z_{Ra} and the basic equilibrium ratio $Z_{Ra}/Z_U = 3.4 \times 10^{-7}$.

The value of Z_{Th} may be calculated from the decay constant of Th. For the following assumed values of the half-life, $T_{1/2}$, of Th we find for Z_{Th} : 1.25×10^{10} yrs, 4.5×10^9 sec $^{-1}$; 1.65×10^{10} , 3.4×10^9 sec $^{-1}$; and 2.2×10^{10} , 2.6×10^9 sec $^{-1}$.

Saturation Current

1. (In Electrostatic Units) (2, 3, 4, 5, 6, 7, 8, 20, 26, 31, 32, 34, 43)

Element	U_I	U_{II}	I_0	Ra	Rn	Ra-A	99.96 % Ra-C'	Po
In equilibrium with 1 g U	$I_0 =$	1.47	0.79	0.82	0.94	1.0s	1.3s	0.91
1 g Ra	$I_0 \times 10^{-4} =$	4.3s	2.3s	2.4s	2.75	3.0s	3.91	2.6s

2. On the basis of a branching ratio of 3% for the Ac family in equilibrium with 1 g Ra (1, 2, 10, 15, 16, 17, 23, 30, 33, 38, 41).

Element =	Pa	Rd-Ac	Ac-X	An	Ac-A	99.7 % Ac-C
$I_0 \times 10^{-4} =$	7.9s	9.0s	8.8s	10.7	11.7	10.4

3. 1 g U in ores [i.e. U + 97% (Io→Ra-G) + 3% (Pa→Ac-D)] is equivalent to $I_0 = 7.30$; 1 g (U_3O_8 →Ra-G) to $I_0 = 6.2$; and 1 g average ore with 50% U_3O_8 to $I_0 = 3.1$.

4. 1 curie Rn is equivalent to $I_0 = 2.75 \times 10^6$ and 1 curie Rn + $\frac{1}{2}$ (Ra-A + Ra-C') to $I_0 = 6.2 \times 10^6$.

5. In equilibrium with 1 g Th and based on the following alternative Z values for 1 g Th: (a), $Z_{Th} = 4.5 \times 10^9$ sec $^{-1}$ and (b), $Z_{Th} = 3.4 \times 10^9$ sec $^{-1}$.

Element	Th	Rd-Th	Th-X	Tn	Th-A	35 % Th-C	65 % Th-C'
(a)	0.264	0.329	0.346	0.382	0.413	0.129	0.355
(b)	0.206	0.248	0.261	0.289	0.312	0.097	0.268

RANGE OF α -PARTICLES IN LIQUIDS AND SOLIDS

All values in microns, $\mu = 10^{-4}$ cm

A. IN LIQUIDS

Liquid.....	From Po (28)	From Ra-C' (27, 48)
$C_2H_5OC_2H_5$	43.0	37.1
C_2H_5OH	36.7	36.3
CS_2	34.3	33.0
C_6H_6	32.0	27.9
$CHCl_3$	27.9	7.05
$C_4H_9NH_2$	70.7	63.9
H_2O	60.0	59.5
$C_2H_5(OH)_2$		
C_2H_5OH		
C_4H_8		
C_6H_6N		
H_2O		

B. IN SOLIDS

From Ra-C' (49, 50, 51)

Solid.....	Li	Mg	Al	Ca	Fe	Ni	Cu	Zn
R_{150}	129.1	57.8	40.6	78.8	18.7	18.4	18.3	22.8
Solid.....	Ag	Cd	Sn	Pt	Au	Tl	Pb	
R_{150}	19.2	24.2	29.4	12.8	14.0	23.3	24.1	

C. IN PHOTOGRAPHIC PLATES

Source	Ra-A	Ra-C'	Th-C	Po
Type of plate	Ilford	Sigurd (Jahr)	Ilford	Sigurd
R_{150}	34.8	50.0	50.7	54
Lit.	(21)	(36)	(21)	(22)
				(36)
				(35)

D. PLEOCHROITIC HALOES v. (53)

STOPPING POWER EQUIVALENTS OF AIR AND METALS AT DIFFERENT PARTS OF THE PATH OF AN α -RAY

Milligrams per cm 2 of foil equivalent to 1 cm air lying between the distances given, measured from end of range. 15°C and 1 atm. (29).

Distances cms	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Al.....	1.90	1.71	1.65	1.64	1.63	1.62	1.62
Ag.....	3.805	3.28	3.10	3.01	2.93	2.86	2.81
Au.....	6.10	4.84	4.44	4.25	4.06	3.96	3.91

INITIAL VELOCITIES OF RECOIL ATOMS

$u = A \times 10^7$ cm sec $^{-1}$

From	To	A =	From	To	A =
U_I	UX_I	2.39	An	Ac-A	3.36
U_{II}	Io	2.54	Ac-A	Ac-B	3.58
Io	Ra	2.62	Ac-C	Ac-C'	3.44
Ra	Rn	2.72	Ac-C'	Ac-D	3.61
Rn	Ra-A	2.96	Th	Ms-Th ₁	2.40
Ra-A	Ra-B	3.16	Rd-Th	Th-X	2.86
Ra-C	Ra-C'	2.99	Th-X	Tn	2.99
Ra-C'	Ra-D	3.66	Tn	Th-A	3.20
Po	Ra-G	3.08	Th-A	Th-B	3.39
Pa	Ac	2.74	Th-C	Th-C'	3.26
Rd-Ac	Ac-X	3.02	Th-C'	Th-D	3.97
Ac-X	An	3.01			

RANGES (PENETRATION) OF RECOIL ATOMS

Ra-A to Ra-B, 0.14 mm in air; 0.83 mm in H $_2$; ca. 20 μ m in Ag (52).

Rn to Ra-A—Ra-C, ca. 10 μ m in Cu and Ni (14, 40).

Th-C to Th-C', at 15° and 1 atm., 0.553 mm in H $_2$; 0.129 mm in air (24).

Th-C to Th-D, 15° 1 atm., 0.963 mm in H $_2$; 0.224 mm in air (24).

THE MCCOY NUMBER

The McCoy number is the ratio of the total α radiation to the uni-directional radiation per cm 2 from a U_3O_8 surface of α -saturated thickness. McCoy (27, 28) found 793 with $I_0 = 1.74 \times 10^{-3}$ es per cm 2 U_3O_8 and St. Meyer and Paneth (34) found 790 with $I_0 = 1.73 \times 10^{-3}$. These numbers are smaller than the theoretical.

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RADIOACTIVE RADIATIONS IN GASES

R. D. KLEEMAN

I. RANGE AND VELOCITY OF α -RAYS IN GASES AT 1 ATMOSPHERE

$$\text{At } t^\circ \text{ and 1 atm., } R_t = R_0 \frac{T}{273.1}$$

RANGE IN AIR AT 0° AND 1 ATM. (13)

From	U _I	U _{II}	Io	Ra	Rn	Ra-A
R ₀ , cms.	2.531	2.910	3.028	3.212	3.907	4.476

From	Ra-C'	Ra-C' ₁ *	Ra-C' ₂ *	Ra-F, Po	Pa	Rd-Ac
R ₀ , cms.	6.608	8.8	10.6	3.721	3.482	4.432

* Two new α -rays from Ra-C' by the scintillation method (24).

From	Ac-X	An	Ac-A	Ac-C	Th	Rd-Th
R ₀ , cms.	4.141	5.487	6.241	5.224	2.749	3.810

From	Th-X	Tn	Th-A	Th-C	Th-C'
R ₀ , cms.	4.127	4.799	5.387	4.538	8.168

MEASURED RANGES IN OTHER GASES

Gas	From Ra-C'				From Po		
	Air	O ₂	H ₂	He	Air	O ₂	H ₂
R ₁₀₀	6.93 to 6.97	6.26	30.93	32.54	3.76 to 3.95	3.43	16.8
Lit.	(12, 18, 17, 27)	(27)	(27)	(27)	(9, 12, 14, 16, 18, 19, 20, 21, 22, 23, 27)	(21, 27)	(21, 27)

Gas	From Po							
	He	N ₂	CH ₄	CO	CO ₂	NO	SO ₂	CH ₃ Br
R ₁₀₀	17.62	3.82	4.18	3.70	2.49	3.41	2.08	1.86
Lit.	(27)	(21)	(21)	(21)	(21)	(21)	(21)	(21)

For range of recoil atoms, see p. 368.

Distribution of Ranges.—This follows a probability law. Thus the most probable range for a Ra-F (=Po) α -ray is 3.85 cm at 15° and 1 atm.; 90% lie between 3.75 and 3.95, and 60% between 3.8 and 3.9 (8). For long range particles from Th-C, Ac-C, and Ra-F, v. (2). I. Curie (8.5) found for a very narrow beam for Po, the range $R_{15}^{70} = 3.87$ cm, as against the much greater value of H. Geiger, $R_{15}^{70} = 3.925$ cm.

Velocity of α -particles.—The velocity, u , of any α -ray may be computed from the relation $u^2 = aR$ where a is a constant and R the length of the remaining path (11). Taking $u = 1.922 \times 10^9$ cm sec⁻¹ (25) as the initial velocity of the α -particles from Ra-C', at 0° and 1 atmosphere in air, this becomes $u = 1.0246 \times 10^9 R^{1/2}$ where R is the range.

Example: R_0 for Th-C' in air is 8.168 cm (Table 1, *supra*). Hence $u = 1.0246 \times 10^9 \times \sqrt{8.168} = 2.064$ cm sec⁻¹, the initial velocity.

The following values of $u \times 10^{-9}$ at 0° and 1 atm. have been directly measured: Ra-A, 1.690 (28); Ra-C', 1.922 (25); Po, 1.593 (7); Th-C, 1.714 (30); Th-C', 2.060 (30). S. Rosenblum (22.5) determined directly the ratio of the initial velocities of the α -particles from Th-C—Th-C' = 1.209.

For velocity of recoil atoms see p. 368.

II. NATURE OF PATH

The path of an α -particle may undergo sudden bends (4, 26, 29). The table gives the number of bends (whose angles lie between the limits $\theta_1 - \theta_2$) for path-lengths (between bends) within the limits $l_1 - l_2$, for 281 Ra-F α -rays in air containing 75% A. The unit of l is λ_{126} cm. 0° and 1 atm. (3).

$\theta_1 - \theta_2 =$	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°	90°-180°
$l_1 - l_2$	3-7	11	20	22	8	13	7	6
	7-15	21	17	16	5	7		5
	15-30	12	8	7	2	5		
	$\theta_1 - \theta_2 =$	10°-20°	20°-30°	30°-180°				
	30-100	20	3	3				

The ionization along the path of a β particle varies inversely as the square of the velocity of the particle (28.5). The table gives the number, N_1 , of ions produced by a ray per first cm of path (13.5). $e = 4.774 \times 10^{-10}$ es.

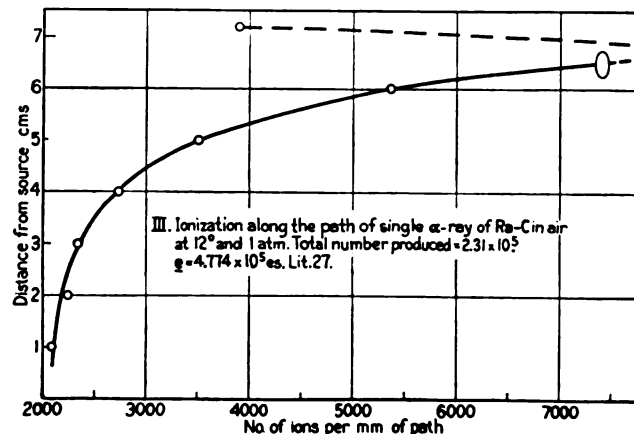
Source	Ac-C''	Th-C''	Ra-B	Ra-C	Ra-E	U
N_1	132	132	130	105	67	76

Coefficients of absorption, λ , of β rays in air and CO₂ at 1 atm. and 22° (18.5).

Substance	Ra-E	Ac-C''	Th-C''	U-X ₁
Air, λ in cm ⁻¹	0.0152	0.0091	0.0068	0.0065
Air, λ in (g/cm ²) ⁻¹	12.70	7.60	5.68	5.43
CO ₂ , λ in cm ⁻¹	0.0297	0.0175	0.0129	0.0114
CO ₂ , λ in (g/cm ²) ⁻¹	16.31	9.62	7.08	6.26

Substance	U-X ₁	Ra-D	Ra-D very soft	Th-B	Ac-B
Air, λ in cm ⁻¹	0.12	0.097	0.64	0.090	0.31
Air, λ in (g/cm ²) ⁻¹	100	81	535	75	260
CO ₂ , λ in cm ⁻¹	0.23	0.183	1.69	0.142	
CO ₂ , λ in (g/cm ²) ⁻¹	126	101	930	78	

Coefficient of absorption λ in cm⁻¹ of γ rays from Ra-C' in air at 1 atm. and 22° is 0.447×10^{-4} (17.5).



IV. STOPPING POWER OF GASES

$S = \frac{R_{gas}}{R_{air}}$ for the same temperature and pressure (6).

1. Ionization method (5). 2. Track-condensation method using Ra-F (21). 3. Scintillation method. α -rays of R_{11} 6.15 cm (1).

Gas	S	Method	Gas	S	Method
A	0.951 Ra-C'	1	CO	.985 Ra-C'	1
	.934 Ra-A			.976 Ra-A	
A	.930	3	CO	1.02 Ra-F	2
H ₂	.24	1	CO ₂	1.505 Ra-C'	1
H ₂	.22 Ra-F	2		1.488 Ra-A	
He	.201	1	CO ₂	1.52 Ra-F	2
He	.1757	3	CH ₄	0.860 Ra-C'	1
Kr	1.330	3		.880 Ra-A	
N ₂	.989 Ra-C'	1	CH ₄	.91 Ra-F	2
	.982 Ra-A		CCl ₄	4.00	1
N ₂	.99 Ra-F	2	CS ₂	2.18	1
Ne	.586	3	CHCl ₃	3.16	1
O ₂	1.064 Ra-C'	1	CH ₃ Br	2.03	1
	1.057 Ra-A		CH ₃ Br	2.04 Ra-F	2
O ₂	1.08 Ra-F	2	CH ₃ I	2.58	1
Xe	1.804	3	C ₂ H ₂	1.118 Ra-C'	1
Air	1.00	1		1.121 Ra-A	
H ₂ O	.77 Ra-F	2		1.122 Rn + Ra	
SO ₂	1.82 Ra-F	2	C ₂ H ₄	1.349 Ra-C'	1
N ₂ O	1.46	1		1.369 Ra-A	
N ₂ O	1.11 Ra-F	2		1.379 Rn	

Gas	S	Method	Gas	S	Method
C ₂ H ₅ Cl	1.405 Ra	1	C ₂ H ₅ O	2.00	1
	2.371 Ra-C'		C ₄ H ₁₀ O	3.437 Ra-C'	1
	2.385 Ra-A			3.471 Ra-A	
C ₂ H ₅ I	3.12	1	C ₂ H ₁₂	3.544 Ra-C'	1
C ₂ H ₆	1.514 Ra-C'	1		3.595 Ra-A	
	1.526 Ra-A		C ₂ H ₄	3.33	1

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ABSORPTION AND DIFFUSION OF β -RAYS IN LIQUIDS AND SOLIDS

PIERRE AUGER

Absorption Coefficients.—If I_0 be the initial intensity, and I_x the intensity after screen thickness x is traversed, $I_x = I_0 e^{-\mu x}$ where μ , the absorption coefficient, varies slightly with the thickness traversed. d = density.

ABSORPTION BY AL

Source	Ra-D	Th-A	Ra-E	Ac-C	Th-D	Ra-C
μ , cm ⁻¹	130	111.0	43.3	28.5	16.3	13.5
Lit.....	(12)					

Source	Ra-D very soft	Ra-B		Rb	Ra	U-X ₁	U-X ₂
		Soft	Hard				
μ , cm ⁻¹	5500	91	13	347	312	500	15
Lit.....	(13)	(6)		(10)	(9)	(5)	(5)

ABSORPTION OF β -RAYS FROM U-X (11)

Screen material.	Ag	Al	C	Ca	Cd	Fe	Ir	Mg	Ni	Pb
μ/d , cm ² g ⁻¹	7.31	4.1	3.75	6.3	7.4	6.61	9.5	4.0	6.35	9.75
Screen material	Rh	S	Sb	Sn	Ta	Zn	NH ₄ Cl	CaSO ₄	SrSO ₄	
μ/d , cm ² g ⁻¹	7.0	4.52	7.74	7.6	8.9	6.4	5.2	4.95	6.50	
Screen material	BaCl ₂	BaSO ₄	NaCl	KF	KCl	KBr	KI			
μ/d , cm ² g ⁻¹	8.07	7.7	4.68	4.8	4.88	6.1	7.8			

ABSORPTION OF β -RAYS OF RA-E (7)

Screen	C	Al	Cu	Mo	Ag	Sn
μ/d	15.8	16.9	19.2	21.0	21.7	22.1

If N is the atomic number of the screening element, $\mu/d = 15 + 0.142 N$.

RANGE IN ALUMINUM OF β -RAYS OF VARIOUS VELOCITIES (LINEAR EXTRAPOLATION)(15)

RH	1380	1930	2535	3170	3790	4400
Range in cm.....	0.018	0.064	0.124	0.189	0.279	0.360
RH	5026	6230	7490	8590	11 370	
Range in cm.....	0.440	0.580	0.785	0.925	1.36	

Velocity Decrease.— R = Radius of curvature of the β -ray in a magnetic field of N units and field force H gauss. ΔRH is the change in RH due to a screen of 0.01 g cm⁻² and is proportional to the velocity. According to Bohr, $\frac{\Delta RH}{c^2} u^2 = a$ constant, K . u = the velocity of the particle, and c that of light (14).

DECREASE OF VELOCITY FOR β -RAYS FROM RA-B AND RA-C

RH	ΔRH	K	ΔRH	K	ΔRH	K
No screen	Mica screen		Sn screen		Au screen	
1392	138.1	34.8	89.2	22.8		
1660	101.4	34.7	67.4	23.4		
1925	78	33.1	56.8	24.1		
2235	72.6	36.2				
2960	66.7	43.5				
3260	59.2	41				
4840	47.3	39.9	37.6	31.7	32.2	27.3
5255	49.3	42.2	37.8	32.5		
5880	43.1	38	32.2	28.6	32.6	29
6160	41	36.7				
7060	38.4	35.4	30.2	27.8		

Dispersion of β -rays (2, 3, 8).

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WAVE LENGTHS OF γ -RAYS

E. VON SCHWEIDLER

GENERAL RELATIONS

A wave length of λ milli-Ångströms ($10^{-3} \text{ Å} = 10^{-11} \text{ cm} = 1 \text{ X-unit}$), corresponds to:

$$\text{A Frequency } (\nu) = 2.9986 \times 10^{11} / \lambda \text{ sec}^{-1}$$

$$\text{An Energy } (E = h\nu) = 1.9653 \times 10^{-8} / \lambda \text{ ergs}$$

$$\text{A Potential } (P = \frac{h\nu}{e}) = 1.2344 \times 10^7 / \lambda \text{ volts}$$

The equivalent electron velocity as a fraction of the velocity of light,

$$(\beta) = \sqrt{1 - \frac{1}{\left(1 + \frac{24.288}{\lambda}\right)^2}}$$

$$h\nu = \frac{hc}{\lambda} = E = Pe = c^2 m_0 \left[\frac{1}{\sqrt{1 - \beta^2}} - 1 \right].$$

See p. 17 for values of basic constants.

WAVE LENGTHS DETERMINED WITH CRYSTAL GRATINGS

φ = angle of reflexion, d = grating space = 2.814 Å for rock salt = 3.028 Å for calcite. $\lambda = 2d \sin \varphi$. Intensity indicated thus, s = small, m = moderate, g = great, vg = very great.

(a) Soft Radiations from Ra-B. Using rock salt (2, 3). Corresponding to L-series of elements of atomic Nos. 82 and 83, according to Swinne (5) and Wagner (6).

λ , in 10^{-3} Å	1365 m	1349 m	1315 s	1286 s	1266 s	1219 s	1196 m
φ , deg. min.....	14° 00'	13° 52'	13° 31'	13° 14'	13° 00'	12° 31'	12° 16'
λ , in 10^{-3} Å	1175 g	1141 m	1100 s	1074 s	1055 s	1029 m	1006 m
φ , deg. min.....	12° 03'	11° 42'	11° 17'	11° 00'	10° 48'	10° 32'	10° 18'
λ , in 10^{-3} Å	982 g	953 m	917 s	853 m	838 m	809 m	793 m
φ , deg. min.....	10° 03'	9° 45'	9° 23'	8° 43'	8° 34'	8° 16'	8° 06'

(b) Hard Radiations from Ra-B + Ra-C, Sec. 1. Radiations from Ms-Th and its products, Sec. 2.

λ , in 10^{-3} Å	428	(393)	(324)	296	262	242	229	196
φ , deg. min.....	4° 22'	4° 00'	3° 18'	3° 00'	2° 40'	2° 28'	2° 20'	2° 00'
Remarks.....	1. Using rock salt (2)	Probably 2nd order spectrum to 196 and 159						
		K-series						

λ , in 10^{-3} Å	169 g	159 g	137	116	99 g	71	72	66
φ , in deg. min.....	1° 43'	1° 37'	1° 24'	1° 11'	1° 06'	43'	41'	37.5'
Remarks.....	K-line						Using calcite (16)	
	Ra-C? Ra-B?							

λ , in 10^{-3} Å	58	48	37	28	168 g	145 g	62 s	52 m
φ , deg. min.....	33'	27.5'	21'	16'				
Remarks.....	Using calcite (13)				to Rd-Th		to Th-B	
					to Ra-Th (20)			

WAVE LENGTHS CALCULATED FROM THE ENERGY OF β -RAYS

Primary γ -rays of energy E_γ produce in the disintegrating atom itself, or in other atoms, secondary β -rays of energy $E_\beta = E_\gamma - A$, where A is the work of removal and depends upon the level from

which the β -rays originate. Sometimes it is assumed that the β -rays are primary and produce secondary γ -rays of energy $E_\gamma = E_\beta$. The energy of the β -rays is obtained from their magnetic deflections.

λ , in 10^{-3} Å		66	230	174	155	51.9	51.3 m
Lit.....	Ra	(14, 23)	(28)	(26)	(26)	(22)	(20, 29)

λ , in 10^{-3} Å	48.0 s	42.6	42.0 m	35.6	35.2 g	Ra-C + Ra-C'	209?	52.1?
Lit.....	(29)	(23)	(26)	(23)	(26)	Ra-C + Ra-C'	(26)	(26)

λ , in 10^{-3} Å	49.8?	44.4?	28.9?	45.4	37.5	32.0	30.2	29.0
Lit.....	(26)	(26)	(26)	(16)	(16)	(16)	(22)	(29)

λ , in 10^{-3} Å	24.9	24.3	21.2	20.6	20.4	20.3	16.2?	10.93 g
Lit.....	(16)	(29)	(29)	(22)	(29)	(26)	(29)	(29)

λ , in 10^{-3} Å	10.0 s	9.93 g	7.00 s	6.94 g	5.56? g	Ra-D		269
Lit.....	(29)	(29)	(29)	(29)	(29)			(13)

λ , in 10^{-3} Å		171	59.7	53.0	37.1	37.0	29.7	26.9 g
Lit.....	Ms-Th	(22)	(22)	(22)	(29)	(22)	(22)	(29)

λ , in 10^{-3} Å		147	52.9 g	52	41.6	41.3 s	Th-C'	45.2 s
Lit.....	Rd-Th	(13)	(29)	(13)	(16)	(29)	Th-C'	(29)

λ , in 10^{-3} Å	24.5	21.3	13.6 g	13.5 g	12.8 m	Th-B + Th-C	4.84	4.71
Lit.....	(16)	(29)	(29)	(29)	(29)	Th-B + Th-C	(24)	(24)

EFFECTIVE WAVE LENGTHS CALCULATED FROM ABSORPTION AND SCATTERING

The ordinary or "apparent" absorption coefficient, $\mu' = \mu + \sigma$, where μ is the "true" or "fluorescent" absorption coefficient, and σ the coefficient of scattering. For dependence on wave length ν . Glocker (8); Compton (12); Wingårdh (23); Warburton and Richtmyer (24); Jauncy (28); and Allen (30).

 γ -RAYS FROM RA-C

$\lambda_{\text{eff.}}$, in 10^{-3} Å	<63	<60	120-60	80-30
Calc. from.....	Abs.	Abs.	Scat.	Abs.
Lit.....	(7)	(8)	(12a)	(10b)

$\lambda_{\text{eff.}}$, in 10^{-3} Å	30-25	21	24	8	19	19.5
Calc. from.....	Scat.	Abs.	Abs.	Scat.	Scat.	Scat.
Lit.....	(12b)	(31)	(33)	(32a, 32b)		

LITERATURE

(For a key to the periodicals see end of volume)

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RADIOACTIVE RADIATIONS FROM ORDINARY METALS

R. B. MOORE

1. POTASSIUM AND RUBIDIUM

β -rays only are emitted spontaneously, the emission being an atomic property independent of the temperature.

ACTIVITY OF K IN ARBITRARY UNITS (4)

Salt	K ₂ SO ₄	KI	KBr	KCl	KF	KClO ₃	KNO ₃
%K.....	44.91	23.58	32.87	52.48	67.32	28.91	28.69
Activity.....	37.8	21	27.8	42.2	54.0	25.5	30.6
K/Act.....	118	112	118	124	123	110	126

ABSORPTION OF THE β -RADIATION (6)

λ = absorption coefficient cm⁻¹, d = density of absorbent

λ/d for β -rays from K	λ/d for β -rays from Rb
By K ₂ SO ₄	11.32
By Sn (90% of the rays)...	14
By Sn (10% of the rays)...	90
By Rb ₂ SO ₄	96.7
By paper (90% of the rays).....	162
By paper (10% of the rays).....	950

ABSORPTION OF β -RAYS FROM Rb BY PAPER (6)

W = wt. paper/cm². I_0 , intensity of the initial radiation; I_p , that of the emergent radiation.

$W \dots$	0.00153	0.00305	0.00458	0.00764	0.0107	0.0153	0.0198
$I_p/I_0 \dots$	10.725	0.545	0.422	0.260	0.159	0.087	0.034

2. CAESIUM, SODIUM, LEAD, IRON AND ZINC

Cs and Na are not radioactive (8, 9, 10). Ordinary Pb shows a slight, very old Pb only a trace of activity. On account of their exceptionally small activity Fe and Zn are recommended for

construction of sensitive instruments for radioactive measurements. Ca, Ba, Sr, C, Cl, Br, Cu, Fe, Pb, Mg, Mn, Ni, Ag, Zn, W, Ta, La, Se, As, Sn, Au, Sb, Al and Hg are inactive (10).

3. NOTES

O. Hahn and M. Rothenbach (3) compared Rb salts of various ages but no difference in activity was detected. The Rb rays were found to be more penetrating than the β -rays of UX₁, but not so penetrating as those of Ra. The ratio of the intensity of the Rb rays to those of UX₁ is 1:15. The half-life of rubidium is calculated to be 10¹¹ years and that of potassium 3 to 7 times greater. The absorption coefficient in Al of K is from 39.6 to 55.4 as foil thickness increases from 0.0135 to 0.0405 cm. Rb decreases from 593 to 522 as foil increases from 0.0017 to 0.0051 cm.

According to Bergwitz (1) the velocity of the Rb rays is 1.85 $\times 10^{10}$ cm-sec⁻¹.

Ringer (7) states that pure K and Rb give off homogeneous β -rays, the K rays having 10 times the penetrating power of the Rb rays. Harkins and Guy (10) give this figure as from 10 to 15 and state that the radiation from Rb is slightly heterogeneous.

Geiger (2) found that the saturation current from RbCl is the same at room temperature and at liquid-air temperatures.

LITERATURE

(For a key to the periodicals see end of volume)

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DISTRIBUTION OF RADIOACTIVE MATERIALS IN THE ATMOSPHERE, THE HYDROSPHERE AND THE LITHOSPHERE

HERMAN SCHLUNDT

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RADON IN THE ATMOSPHERE

Method A: Rn absorbed in charcoal.

Method B: Rn condensed with liquid air.

Method C: Rn directly determined in large ionization chamber.

Method D: Rn computed from active deposit on negatively charged wire.

Place	Micro-micro Curies (10 ⁻¹² Curies) Rn per cubic meter	Method	Number of determinations	Lit.
Montreal, Can.....	24-127, Mean, 80	A		(21)
Montreal, Can.....	Mean, 60	A	50 during 1907-8	(22)
Cambridge, Eng.....	35-350, Mean, 105	A	60 during 6 mos	(23)

Place	Micro-micro Curies (10^{-12} Curies) Rn per cubic meter	Meth- od	Number of determina- tions	Lit.
Chicago, U. S. A.	45-200, Mean, 100	B	6	(1)
Manila, P. I.	71	A	30 during 1 year	(136)
Freiburg, Switzerland	54-305, Mean, 131	A or B		(78)
Innsbrück, Austria...	40-1110, Mean, 433	C	49	(137)
Seeham, Austria.....	188	C		(116)
Tokyo, Japan.....	5	D		(49)
Pacific Ocean.....	1.3	D	Mean of 169, 1915-21	(66)
Atlantic Ocean.....	1.7	...	Mean of 79	(66)
Indian Ocean.....	1.3	...	Mean of 37	(66)
Southern Ocean S. of lat. 50°	0.3	...	Mean of 48	(66)
All accessible ocean areas.....	1.2	...	Mean of 333	(66)
High seas.....	2.6	...	Mean of ca. 400*	(66)

* Includes some made relatively near large bodies of land.

RADIOACTIVITY OF SPRING AND WELL WATERS AND SPRING GASES

$m\mu\text{Cl}^{-1}$ = Millimicrocuries (10^{-9} Curies) per liter

Ra, $\mu\text{g}\text{l}^{-1}$ = Dissolved radium, micro-micro-grams (10^{-12} g) per liter

NORTH AMERICA

Source	t°C	mμCl ⁻¹		Ra, μμg l ⁻¹	Lit.
		Water	Gas		
CANADA					
Quebec					
Maskinonge.....	8	0.079	0.250	0.5	(99)
Radnor Forges.....	10	0.345		0.3	(99)
St. Benoit.....	11	0.028		0.0	(99)
St. Leon (Lupien).....	8	0.148	0.46	0.8	(99)
St. Hyacinthe (Philudor)....	8	0.106		46	(99)
St. Severe.....	8	0.087		2.8	(99)
Varennes.....	9	0.224	0.81	9.2	(99)
Ontario					
Borthwick, near Ottawa.....	11	0.140		8.4	(99)
Sulfur Spring, Caledonia Spr.	8	0.073		5.6	(99)
				15.0	(23)
Duncan Spring, Caledonia Spr.....	9	0.053	0.204	5.6	(99)
Duncan Spring, Caledonia Spr.....	9		0.42	18.0	(23)
Gas Spring, Caledonia Spr..	8	0.090	0.306	8.4	(99)
Gas Spring, Caledonia Spr..	8		0.62	15	(23)
White Sulfur Spring, Cars- bad.....	9	0.09		0.8	(99)
Magic Spring.....	9	0.087		25	(99)
Soda Spring.....	9	0.081	0.23	1.1	(99)
Russell Lithia, Bourget.....	10	0.056		5.9	(99)
Alberta (Banff)					
Upper Hot Spring.....	46	0.221		8.6	(99)
Kidney Spring.....	39	0.392		8.5	(99)
Cave Spring.....	30	0.470	3.34	8.5	(99)
Basin Spring.....	35	0.232	2.37	8.5	(99)
Auto Road Spring.....	19	0.640		23.5	(99)

Source	t°C	mμCl ⁻¹		Ra, μμgl ⁻¹	Lit.
		Water	Gas		
British Columbia					
Fairmont Springs.....		3.5		100	(11)
Sinclair.....		4.0		tr.	(11)
UNITED STATES					
Arlington, R. I.					
Graphite Mine Spr.....		8.78			(79)
Williamstown, Mass.					
Wampanoag.....	22	0.22	7.3		(118)
Sherman Spring.....		0.04			(118)
Saratoga Spr., N. Y.					
Emperor.....	10	0.07	0.221	68	(71)
Hathorn No. 1.....	10	0.142	0.213	42	(71)
Geyser.....	10	0.039	0.034		(71)
Pump Well No. 4.....	12	0.231	0.678	21	(71)
Crystal Rock.....	10	0.88	0.847	9	(71)
Indiana					
Mean of 27 sprs.....	cold	0.75			(89)
French Lick					
Pluto Spring.....	13	0.54			(5)
Bowles Spring.....	10	1.78			(5)
Illinois					
Dixon Spr. No. 2.....		2.93			(115)
Creal Spr. No. 3.....		0.84			(115)
Well, Joliet.....		0.39			(115)
Mt. Vernon Spring.....		0.18			(115)
Yellowstone Nat. Pk.					
Mammoth Hot Spr.,					
Hot River.....	51	1.44		2.5*	(104)
Main Spring.....	71	none	none	3.8*	(104)
Apollinaris Spr.....	9	1.08			(104)
Nymph Spring, Tower Falls.		0.23	6.5		(104)
Upper Geyser Basin, Bench					
Spring.....	86	0.22	124		(104)
Fish Cone, West Thumb....			41.8		(104)
Lower Geyser Basin, Firehole					
Lake.....	85	0.28	294		(104)
Missouri					
Sweet Springs.....		0.81			(103)
Rollins Spring, Columbia....		0.15			(103)
Hot Springs, Ark.					
Imperial Spring.....	61	9.03			(9)
Palace Spring.....	61	0.12			(9)
Avenue Spring.....	62	0.89			(9)
Twin Spring.....	62	2.22			(9)
Arsenic Spring.....	54	0.49			(9)
Horseshoe Spring.....	60	0.18			(9)
Liver Spring.....	8	0.59			(9)
Kidney Spring.....	13	3.63			(9)
Madison, Wisconsin					
Merrill Springs.....		0.49			(101)
Manitou, Colo.					
Shoshone Spring.....	15	3.38	12.7		(102)
Manitou Soda.....	15	1.25			(102)
Manitou Soda.....	15	0.268	1.62		(54)
Shoshone.....		1.66	15.52		(54)
Iron Soda Spring.....	15	0.24	1.15		(54)
Iron Soda Spring.....	15	1.53	1.07		(102)
Navajo Spring.....		1.37	3.4		(102)
Navajo Spring.....	22	1.21	3.3		(54)
Steamboat Springs, Colo.					
Soda.....	15	0.18	1.42		(102)
Soda.....	15	1.36	6.03		(54)

* Ra in 10^{-12} g per g of residue.

Source	t°C	mμCl ⁻¹		Ra, μμgl ⁻¹	Lit.
		Water	Gas		
UNITED STATES.—(Cont'd)					
Steamboat Springs, Colo.— (Cont'd)					
Bath House.....	40	0.08	0.54		(102)
Bath House.....	40		0.79		(84)
Iron.....	24	0.99	3.71		(102)
Iron.....	24	0.91	3.50		(84)
Craddock, Glenwood Springs, Colo.....		2.21			(84)
Virginia					
Mean of 11 springs.....		0.21			(120)
Ohio					
Mean of 9 springs.....	cold	0.34			(89)
Bloomington, Ind.					
Hottle Spring*.....		0.806			(90)

* Mean of 37 tests during 9 months.

EUROPE

Source	t°C	mμCl ⁻¹		Lit.
		Gas	Water	
AUSTRIA				
Tauern Tunnel.....		3.81*		(62)
Böckstein Valley.....		3.20†		(62)
Near Vienna				
Johannesbad.....	30	1.86	6.8	(63)
Haupt Quelle, Vöslau.....	23	0.29	1.07	(63)
Tyrol				
Magenquelle, Froy.....	6	17.6		(2)
Eisenquelle, Froy.....	8	4.5		(2)
Badequelle, Steinhof.....	9	0.8		(2)
Herrenbadquelle, Fischau.....	19	0.23	0.80	(63)
Gastein				
Grabenbäckerquelle.....	36	55.5		(60, 61)
Elizabethstollen, Hauptquelle..	47	53.3		(61)
Nordquelle.....	44	9.0		(61)
Rudolfstollen.....	47	21.3		(61)
Franz Josephstollen.....	41	34.6		(60, 61)
Reissacherstollen.....	36	84		(61)
Teichquelle, Tanbach.....		21.3		(61)
Melaniequelle, Radegund.....		5.3		(132)
Annenquelle, Mariatrost.....		0.36		(132)
Johannesbrunnen, Semmering....	5	1.27		(3)

* Mean of 101 springs; highest 23.7.

† Mean of 3 springs.

Source	$m\mu Cl^{-1}$		Lit.
	Gas	Water	
BELGIUM			
Delcor Spa.....	1.45		(34)
Marie-Henriette Spa.....	1.45		(34)
Prince de Conde I. Spa.....	1.44	1.74	(34)
Tounelet, Spa.....	1.67	2.58	(34)
La Fraineuse Spa.....	2.43		(34)
Claire-Fagne Spa.....	2.1		(34)
Salmon E. superieure Spa.....	3.31		(34)

Source	t°C	mμCl ⁻¹	
		Water	Gas
CZECHO-SLOVAKIA (20, 51, 63, 139)			
Loimannsquelle, Franzenbad.....	11	0.39	0.27
Salsquelle, Franzenbad.....	11	0.05	
Mine water, St. Joachimsthal 60 m depth.....	6	13.5	
375 m depth.....	14	75.9	
500 m depth.....		163.8	448.0

Source	t°C	mμCl ⁻¹		Lit.
		Water	Gas	
Bernhardsbrunnen, Karlsbad.....	61	0.65	1.14	
Mühlbrunnen, Karlsbad.....	39	12.9	38.6	
Schlossbrunnen, Karlsbad.....	30	7.1	20.6	
		3.61		
Hospitalquelle, Karlsbad.....	12	0.96		
Sprudel, * Karlsbad.....	71	0.16	0.36	
Eisenquelle, Karlsbad.....	8	15.7		
		19.5		
Ferdinandsbrunnen, Marienbad....	10	0.27		
Kreuzbrunnen, Marienbad.....	8	1.75	3.56	
Marienquelle, Marienbad.....		0.71		
Waldquelle, Marienbad.....	7	1.87	4.47	
Augenquelle, Teplitz Schönau.....	22	1.28		
Riesenquelle, Dux.....		3.58		
Urquelle, Dux.....	46	2.03	9.0	

* 55 × 10⁻¹² Ra per liter.

Source	$m\mu Cl^{-1}$		Lit.
	Water	Gas	
ENGLAND			
Nine Wells, Cambridge.....	0.130	33.65	(94)
Well, Dale's Brewery, Cambridge...	0.196		(94)
King's Well, Bath.....	1.73		(88)
Cross Spring, Bath.....	1.19		(88)
Hetling Spring, Bath.....	1.70	7.70	(88)
Hospital Natural Baths, Buxton...	0.83		(64)
Gentlemen's Natural Baths, Buxton.	1.10		(64)

Source	t°C	mμCl ⁻¹		Lit.
		Gas	Water	
FRANCE				
Choussy, La Bourboule.....		22.9	141.5	(52)
Choussy, La Bourboule.....		20.5	161.4	(53)
de la Grange, Beaucens.....		3.03	10.36	(52)
Chaupe, Audinac.....		0.14	0.59	(52)
Rivière, Chaudéau.....		6.51	39.5	(12)
Dames, Plombières.....		10.76		(12)
Lambinet, Plombières.....		15.96		(12)
Savonneuse, No. 2, Plombières....		7.47	35.1	(12)
Vauquelin, Plombières.....		4.83	86.4	(12)
Chaudes-Fontaines, Reherry.....		4.1	19.8	(12)
Celestins, Vichy.....	44	0.653	4.1	(52)
Chomel, Vichy.....	44	0.653	4.1	(52)
Boussange, Vichy.....	42	0.103	0.60	(52)
Hôpital, Vichy.....	34	0.022	0.14	(52)
Condanny, Usson.....		0.563	34.5	(65)
Plaies, Usson.....		0.663	1.9	(65)
d'Alun, Aix-les-Bains.....		4.1	25.8	(16)
Le Lymbe, Bourbon-Lancy.....		1.5	14.6	(16)
Pavillon, Coutreville.....		0.51		(16)
Bordeu (Grande Source), Luchon...	43	16.1	134.8	(73)
Main Spring (Saline and H ₂ S), Uri- age-les-Bains.....		0.113		(8)
Gasseng, Columbières-sur Orb.....			6.69	(18)
Cabanel, Columbières-sur Orb.....			2.22	(18)
Crémieu, Columbières-sur Orb.....			1.49	(12)
Viguerie, Ax.....			16.8	(72)
Savonneuse, Bains-les-Bains.....			25.6	(72)
Vielle, Eaux-Bonnes.....			3.7	(72)
La Chaldette.....			93.7	(72)
Romaine, Maizières.....			10.8	(72)
Souveraine, Vals-les-Bains.....		1.047	5.08	(6)
Dominique, Vals-les-Bains.....		8.80		(6)

Source	t°C	m μ Cl ⁻¹		Lit.
		Gas	Water	
Caroline, Mont-Doré.....		0.34	2.49	(57)
Lepape, Bagnères-de-Luchon.....		41.5		(53)
Providence, Vernet-les-Bains.....	38	15.7	115.9	(53)
Santé, Vernet-les-Bains.....	37	2.7		(53)
Pastural, Les Escalades.....	27	3.5		(53)
Bassin Carré, Thuaes-les-Bains.....	74	1.04	17.7	(53)
Saint-Victor, Royat.....	21	15.35	35.2	(53)
Hamel, Sail-les-Bains.....	34	11.5	50.2	(53)
Rouge, Saint-Nectair.....	21	0.54	2.2	(53)
Grande Source, Bagnoles-de-l'Orne.....		0.74		(56)
Chaude fontaine, Antoigny.....		3.86		(56)
Saint-Ursin, Lignières.....		1.57		(56)
Fontaine Minérale, St. Michel.....		0.44		(56)

Source	t°C	$\frac{m\mu\text{Cl}^{-1}}{\text{Water}}$	Lit.
GERMANY			
Schwarzwald Region			
Antoniusquelle, Antogast.....	cold	6.6	(20)
Büttquelle, Baden-Baden.....	24	51.3	(20)
Murquelle, Baden-Baden.....	59	9.8	(20)
Kirchenquelle, Baden-Baden.....	56	1.35	(20)
Hauptquelle, Badweiler.....	28	3.1	(20)
Gemeindequelle, Badweiler.....	23	4.2	(20)
Badquelle, Griesbach.....	cold	10.6	(20)
Sofienquelle, Petersthal.....	cold	1.76	(33)
Wenzelquelle, Rippoldsau.....	cold	0.86	(33)
Warme Quelle, Wildbad.....	36	1.35	(20)
Kalte Quelle, Wildbad.....	cold	0.08	(20)
Well, Heidelberg.....	27	2.15*	(7)
Württemberg			
Göppinger, Sauerbrunnen.....		1.27	(50)
Göppinger, Staufenbrunnen.....		0.57	(50)
Kursaal, Kanstatt.....		0.22	(50)
Karlsquelle, Mergentheim.....		0.98	(50)
Hirschquelle, Feinach.....		0.42	(50)
Wildbad.....		0.76	(50)
Hessen and Adjoining Regions			
Sprudel XII, Bad Nauheim.....	33	5.8†	(105)
Karlsbrunnen, Bad Nauheim.....	15	9.6†	(105)
Bad Homburg, Elisabethbrunnen.....	11	1.46†	(105)
Luisenbrunnen.....	11	0.84†	(105)
Wilhelmsbrunnen, Bad Soden.....	14	6.62†	(105)
Solbrunnen, Bad Soden.....	16	1.58†	(105)
Inselquelle, Kreuznach.....	13	7.42†	(105)
Theodorshalle, Kreuznach.....	7	3.06†	(105)
Hauptbrunnen, Münster am Stein.....	31	8.5†	(105)
Kochbrunnen, Wiesbaden.....	68	0.43‡	(39)
Adlerquelle, Wiesbaden.....	64	2.23‡	(39)
Schützenhofquelle, Wiesbaden....	50	0.29‡	(39)
Racoczy, Kissingen.....		1.04†	(42)
Maxquelle, Kissingen.....		1.58†	(42)
Maxquelle, Dürkheim a.d. Haardt.....	20	0.69	(7)

* 1620 $\times 10^{-12}$ g Ra per liter of water.† Values obtained by multiplying Maché units by 3.64×10^{-10} .‡ Values obtained by multiplying Maché units by 4.1×10^{-10} .

Source	m μ Cl ⁻¹ Water	No. of samples	Lit.
Bavaria			
Alexanderbad.....	7.73	2 spr., 6 wells, 1 reservoir	(38)
Ebermannstadt and env.....	0.43	18 spr., 2 w.	(38)

Source	m μ Cl ⁻¹ water	No. of samples	Lit.
Epprechtstein and env.....	1.17	2 spr., 7 w., 2 reservoirs	(38)
Fichtelgebirge, Neubau.....	1.55	5 spr., 8 w.	(38)
Leinleiterthal.....	0.36	21 spr., 5 w.	(38)
Leupoldsdorf and env.....	25.0	6 spr., 2 w., 5 reservoirs	(38)
Schwarzenfeld and env.....	0.64	3 spr., 6 w.	(38)
Weisenthau.....	1.32	15 spr., 6 w.	(38)
Wolsenberg and env.....	4.87	17 springs	(38)
Wundsiedel and env.....	7.7	13 spr., 6 w., 1 reservoir	(38)
Saxony			
Wettingquelle, Brambach.....	826.2		(31)
	650 to 754		(59)
Trinkquelle, Oberschlema.....	688 to 920		(59)
Marx Semler Stollen, Ober- schlema.	288 to 330 at 10°C		(97)
Himmelfahrtstollen, Georgen- thal.....	24.1		(97)
Olga Brunnen, Schneeberg.....	13.1		(97)
Rockelmann Quelle, Schwar- zenberg.....	12.3		(97)

Source	t°C	m μ Cl ⁻¹		Lit.
		Water	Gas	
HUNGARY				
Budapest				
Rakocsy, St. Lucasbad.....	42	7.40		(134)
Composite, 17 spr. Lucasbad.....		3.35	9.08	(128)
Trinkquelle, Kaiserbad.....	60	0.31		(134)
Grosse Quelle, Ritzenbad.....	43	3.16		(134)
Kerekmalom Quelle.....	20	0.11		(32)
Arpadquelle.....	23	0.046	0.624	(32)

Source	t°C	m μ Cl ⁻¹ Water	Lit.
ITALY			
Sorgente Montirone, Abano near Padua...	87	2.05*	(20)
Upper Sulfur Therm, Aqui Piemont.....	72	0.28*	(20)
Fiuggi, Anticoli.....		8.02*	(20)
Surgonne Grotta, Battaglia near Padua...	74	3.34*	(20)
Acidola, Castellamare.....	13	9.27*	(20)
Domenico Tricarico, Bagnoli near Naples.	52	0.79*	(20)
Purgativo, Agnano near Naples.....	90	0.79*	(20)
Stabilimento, Porto d'Ischia.....	65	1.93*	(20)
Manzi I, Cassamicciola, Ischia.....	85	0.57	(20)
Old Roman Spring, Lacco Ameno, Ischia..	57	152.5*	(20)
Fonte di Castello, Santa fiora.....	12	3.01	(77)
Fonte della Casella, Casteldelpiano.....	12	1.85	(77)
Acqua dei Bagnoli, Acidoso.....	14	3.29	(77)
Polla di Sotto, Bagnore.....	20	1.52	(77)
Sambuco, Montagna.....	8	2.08	(77)
Baleno Carcaiole, Uliveto.....		1.09	(75)
		Gas = 8.6	
Pozzo delle Saline, Salsomaggiore.....		4.41	(76)
Bagni di Casciana.....		0.0	(77)
		Gas = 1.8	
Parlanti, Monsummano.....	31	0.064	(92)

* Values obtained by multiplying Maché units by 4.1×10^{-10} .

Source	t°C	mμCl ⁻¹ Water
NORWAY (86)		
Nasodden.....		17.9
Sandsvar.....		12.9
Jellum, near Modum.....		31.2
Tandberg estate, Simoa Valley.....		67.4
PORTUGAL (81)		
Sabroso, Sabroso (Vidago).....		3.29
Fonte Romana, Fonte Romana.....		2.05
Da Bica, Ferez.....		8.20
Das Lamas, Cucus.....		10.4
RUMANIA (58)		
Orsova		
Hercules, Baile Herculane.....	46	0.19*
Regina Maria, Baile Herculane.....	60	0.22
RUSSIA (68)		
Essentuky No. 6, Caucasus.....		3.5
Batalinsky, Caucasus.....		0.6
SPAIN (15)		
Rivas, Girona.....		0.33
Buitre, Seirra de Fuensante, Murcia.....		0.05
Garganton y Pianolon, Sierra de Guadarrama.....		12.5
La Raja, Mazarron, Murcia.....		0.46
El Tubo, Mazarron, Murcia.....		0.48
Posa de Levante, Mazarron, Murcia.....		0.36
Medica Catalan, Mazarron, Murcia.....		0.68
SWEDEN (91, 119)		
Slottskallan, Upsala.....	7	1.8
Bourbrum, Upsala.....	6	1.55
Birjerjarlsgr No. 120, Stockholm.....	6	14.6
Gamla (spring), Porla.....	7	1.77
Sofia (spring), Helsingborg.....	10	3.00
Villastaden (drilled well), Lidington.....	8	17.06
Norrb, L. (well), Bodens fastning.....	5	70.6
Stockh l. (well), Vinterviken.....	10	67.2
Hermelinsgruf (well), Malmberget.....	3	2.75
Kalmar, l. (spring), Sodra Vi.....	6	14.1
Sanatorie parken (spring), Mosseberg.....	7	0.90

* Emanation content changes with season and even on same day.

Rock formation of source	No. samples	mμCl ⁻¹ Water
SWEDEN.—(Continued)		
Boulders, morainal deposits.....	110	2.40
Diabase.....	10	0.70
Granite (Archean).....	53	13.24
Granite (gneissic).....	20	5.66
Granulite.....	14	10.2
Gray gneiss with granite intrusives.....	6	6.11
Gneiss (granitic).....	20	2.99
Iron-bearing gneiss.....	12	9.31
Limestone.....	42	0.78
Peat.....	16	1.18
Quartz porphyry.....	5	2.09
Sandstone.....	37	2.91
Slate.....	42	1.11
Syenite and granulitic syenite.....	15	15.46

Source	t°C	mμCl ⁻¹ Water	Lit.
SWITZERLAND			
St. Placidus Spring, Disentis.....		4.66	(127)
Val Lunpegnia, Disentis.....	8	3.75	(117)

Source	t°C	mμCl ⁻¹ Water	Lit.
Leuk.....	51	0.12	(127)
Waadt, Lavey.....		4.51	(117)
Paracelsusquelle, Engadine, St. Moritz.....	5	0.57	(117)
Stollenquelle, Pfafers-Ragaz.....	36	0.29	(117)
Sotsassquelle, Schuls.....		0.42	(117)
Carolaquelle, Tarast.....	7	0.46	(117)
Kurhaus, Acquarossa.....	25	1.24	(117)
Thomas, Val Sinestra.....	8	0.26	(117)
Les Trois Pigeons, Valangin.....		0.24	(80)
Come Girard, Locle.....		0.26	(80)
Vioulou, Paturage, Locle.....		0.37	(80)
Eplatures.....		0.15	(80)

ASIA

Source	t°C	mμCl ⁻¹ , Water
INDIA (122)		
Kaira District, Bombay		
Hot Spring.....	67	33.0 to 62.1
Cold Spring.....	28	33.9

Source	t°C	mμCl ⁻¹	
		Water	Gas
JAPAN (44) 4/			
Kami-no-yu, Tamatsukuri.....	64	1.08	10.18
Kami-no-yu, Misasa.....	71	51.69	
Kabu-yu, Misasa.....	45	3.72	22.82
Kaminoyu, Dogo.....	47	1.45	8.5
Tama-no-i, Dogo.....	cold	0.39	
Hirano, Tansan-sen.....	26	0.07	0.21
Gosho-no-yu, Kinohaki.....	60	3.06	
Ko-no-yu, Kinohaki.....	57	0.94	
Furosén, Beppu.....	58	0.07	
Kamigawara No. 1, Masutomi.....	22	301.2	
Kuridaira No. 1, Masutomi.....	16	214.7	550.6
Yunosawa-Onsen, Innai-Yunosawa.....	41	0.43	
Takinoyu, Noboribetsu.....	72	0.074	
Yojo-Kwan-no-yu No. 1, Togo.....	50	1.12	
Jizo-no-yu, Kusatsu.....	57	0.057	0.065
Akakura-Onsen, Akakura.....	62	0.43	
Ji-no-yu, Isobe.....	9	1.55	0.74
Arima-Onsen, Arima.....	52	0.92	
Maruyama-Kosen, Arima.....	19	3.01	
Zui-hoji-Onsen, Arima.....	31	13.8	
Arifuku-Onsen, Arifuku.....	43	0.80	
Kizu-no-yu, Asama.....	44	0.51	
O-yu, O-yu.....	57	1.13	trace
Kami-no-yu, Oyu.....	58	0.4	
Shimo-jyaya-no-yu, Sekigane.....	44	10.95	
Soto-no-yu, Katsura.....	29	0.31	
Yuatsumi-no-yu, Atsumi.....		0.40	
Awazu-Onsen, Awazu.....	54	0.35	
Kami-no-moto-yu, Bobata.....	14	4.35	
Goshiki-Onsen No. 2, Goshiki.....	39	0.80	
Tsubataya-uchi-yu, Shibu.....	48	0.11	
Hie-no-yu, Kaminoyana.....	62	0.86	5.5
Shiotsu-no-Tsubo, Katayamazu.....	79	0.47	8.79
Gosho-no-yu A, Kinohaki.....	63	2.67	
Koyabara-Onsen, Koyabara.....	38	1.37	2.95
Murasugi-Kosen No. 1.....	26	18.04	
Osakaya-no-yu, Musashi.....	45	1.17	11.8
Shirataki-no-yu, Nakabusa.....	60	0.59	
Tsuru-no-yu, Mikko-Yumoto.....	62	0.85	
Shin-yu, Unzen.....	38	0.85	

Source	t°C	m μ Cl ⁻¹	
		Water	Gas
Ogawa-Onsen No. 2.....	49	1.01	
Omaki-Onsen, Omaka.....	49	0.48	
Taki-no-yu, Onogawa.....	70	2.37	
Umeka-no-yu, Owani.....	62	4.21	
Shigaku-Onsen, Shigaku.....	47	0.43	0.64
Ena-Kosen, Takayama.....	10	102.2	
Takarazuka-Tansan-sui, Takarazuka	19	1.20	0.72
Tochiomata-no-yu, Tochiomata.....	39	9.40	
Wakazaki-no-yu No. 1, Wakura.....	93	2.52	33.9
Yamanaka-Onsen, Yamanaka.....	45	0.62	
Yamashiro-Onsen.....	69	0.25	
Tottori-Onsen, Yoshikata.....	48	1.19	
Kasuga-Onsen, Teramadu.....	29	0.22	0.88
Kabu-yu, Yudani.....	32	1.54	8.65
Sento, Yukiku.....	67	0.23	3.34
Kabu-yu, Yummra.....	91	0.31	
Sagi-no-yu, Yunogo.....	38	0.31	1.95
Taki-no-yu, Yunokawa.....	50	0.74	8.23
Shinyu, Yunotsu.....	4	1.8	0.49

Source	t°C	m μ Cl ⁻¹ Water	Lit.
PHILIPPINE ISLANDS			
Sibul Springs, Bulacan.....		1.28	(135)
Pansol Springs, Laguna.....		none	(135)
Bambangan Spr., Laguna.....		0.15	(135)
Adukpung Spr., Kiangnan.....		1.33	(37)
Artesian Well, Batangas.....		2.11	(135)
Sinaba Spring, Laguna.....		1.3	(37)
Mairut Salt Spr., Bontoc.....	100	none	(37)
Salinas Salt Spring, Nueva Vizcaya.....	31	0.095	(37)

AFRICA

Source	t°C	m μ Cl ⁻¹ Water
ALGERIA (85)		
Bains de la Reine, near Oran.....	50	13.1
Louise, A Hammam Bou Hadjar.....	44	22.4
Hotel de Vichy, A Bou Hanifia.....	55	1.3
d'Alma T'zoumoulal.....	17	5.3

THE LITHOSPHERE

Uranium and Thorium Radioactive Minerals

The numbers following the name of the mineral represent weight percent of U, resp. Th. The qualitative chemical composition is indicated in parentheses (), the locality in brackets [], R = "rare earths;" aq. = "hydrous."

A. Aeschynite: U 0.3, Th 0-20 (RNbTiO₃). *Auerite*: Th 61 (ThSiPO₄). *Autunite*: U 50 (UCaPO₄aq.).

B. Becquerelite: U 70 (UO₃aq.) [Belg. Congo] (111). *Blomstrandite*: U 22 (TaNbUO₆).

C. Calciorthorite: Th 53 (RCaSiO₃aq.). *Carnotite*: U 53 (KUVO₃aq.). *Chalcolite*: (See Torbernite). *Cleveite*: U 60; Th 4 (UThYO₃). *Curite*: U 73 (UPbO₃aq.) [Belg. Congo] (106).

D. Dewindtite: U 50 (PbUPO₃aq.) [Belg. Congo] (108). *Dumontite*: U 56 (PbUPO₃aq.) [Belg. Congo] (114).

E. Ebigite: *Fluetherite* (See Uranothallite). *Eliasite*: also Pit-tinite (See Gummite). *Erdmanite*: Th 9 (FeCaThBSiO₃). *Euxenite*: (Polycrase) U 5-15 (RNbTaO₃aq.).

F. Fergusonite: (Bragite, Tyrite, Yttrotantalite) U 1-7, Th 2-5 (RNbTaO₃). *Freyalite*: Th 24 (RThSiO₃aq.). *Fritzscheite*: (UMnVO₃aq.).

G. Gadolinite: Th < 1 (RO₂SiO₃). *Gummite*: (Eliastite, Pit-tinite) U 60 (UPbCaSiO₃aq.).

H. Hatchettolite: U 13 (UCaNbTaO₃). *Hokulolite*: (PbBaSO₄) [Japan] (44).

J. Johannite: U 56 (CuUSO₄aq.).

K. Kasolite: U 40 (PbUSiO₃aq.) [Belg. Congo] (107). *Kochelite*: (See Fergusonite).

L. Liebigite: U 31 (UCaCO₃aq.).

M. Mackintoshite: U 20; Th 42 (RUThSiO₃aq.). *Medjidite*: (A variety of Uranopilite). *Mendeleeffite*: U 20 (UNbTiO₃) [Transbaikalia] (129). *Microilite*: U 1.6 (CaTaO₃). *Monazite*: Th 7-20 (RPO₃).

N. Naegite: U 2.5; Th 45 (ZrRSiO₃) [Japan] (44). *Nivenite*: (See Uraninite). *Nohlite*: (See Samarskite).

O. Orangite: U 1-10; Th 65 (A variety of Thorite).

P. Parsonite: U 32 (PbUPO₃) [Belg. Congo] (112). *Phosphuranylite*: U 60 (UO₃PO₄aq.). *Pilbarite*: (PbUThSiO₃aq.). *Plumboniobate*: U 12 (PbUYNbO₃). *Pitcheblende*: (See Uraninite). *Polycrase*: (See Euxenite). *Priorite*: (See Blomstrandite). *Pyrochlore*: Th 0-6 (RCaNbO₃).

R. Randite: (See Voglite). *Rowlandite*: U 0.4 (YSiO₃). *Rutherfordine*: U 65 (UO₂CO₃). *Rutherfordite*: (A variety of Fergusonite).

S. Samarskite: U 1-3 (RUNbTaO₃). *Schoepite*: (UO₂CO₃) [Belg. Congo]. *Schrockingerite*: (A variety of Voglite). *Sipylite*: U 3 (ErNbO₃). *Soddite*: U 71 (USiO₃aq.) [Belg. Congo] (110). *Stasite*: U 50 (PbOPO₃aq.) [Belg. Congo] (109). *Skaldowskite*: U 55 (MgUSiO₃aq.) [Belg. Congo] (113).

T. Thorogummite: U 18; Th 36 (UThPbSiO₃). *Thorianite*: U 12; Th 65 (RThUO₃). *Tritomite*: Th 5-8 (Th, Ce, Ca, Ta, B, F, SiO₃). *Torbernite*: U 50 (UCaPO₃aq.). *Trögerite*: U 53 (UAsO₃aq.). *Tscheffkinite*: Th 1-17 (RFeSiTiO₃). *Thysonite*: U 65 (U(OH)₂SO₄).

U. Uraninite: (Pitchblende) U 65-80; Th 1-8 (UO₂RUPbO₃). *Uranochalcite*: (A variety of Uranopolite). *Uraconite*: (A variety of Uranopolite). *Uranocircite*: U 47 (BaUPO₃aq.). *Uranophane*: U 55 (UCaSiO₃aq.). *Uranopolite*: U 64 (UO₂CaSO₄aq.). *Uranosphaerite*: U 42 (UO₂BiOUO₃aq.). *Uranospite*: U 49 (UCaAsO₃aq.). *Uranothallite*: U 32 (CaUCO₃aq.). *Uranothorite*: U 8; Th 52 (ThSiO₃).

V. Voglianite: (A variety of Uranopolite). *Voglite*: U 34 (CaCuUCO₃aq.).

W. Walpurgite: U 16 (BiUAsO₃aq.).

X. Xenotime: U 3; Th 0-2 (YPO₄).

Y. Yttrocrasite: U 2; Th 0-8 (YTtO₃). *Yttrotantalite*: U 0.5-2 (YNbTaO₃).

Z. Zuenerite: U 50 (CuUAsO₃aq.).

RADIOACTIVITY OF ROCKS

Ra unit = 10⁻¹² g Ra (element) per g. Th unit = 10⁻⁶ g Th (element) per g

IGNEOUS ROCKS

Name and locality	No. specimens	Ra mean	Lit.
Acidic Intrusives			
Charnockite			
Mysore State, India.....	3	0.09	(121)
Granite			
Mysore State, India.....	11	1.03	(121)
Dutch East Indies.....	5	4.9	(13)
Eisenach, Germany.....	1	3.5	(67)
Germany.....	7	9.8	(13)
France (1) Holland (2).....	3	8.8	(13)
St. Francois Co., Mo., U. S. A.....	1	1.5	(100)
Ireland.....	10	2.0	(46)
Leinster, Ireland.....	28	1.7	(28)
Th mean =	28	7.0	

Name and locality	No. specimens	Ra mean	Lit.	Name and locality	No. specimens	Ra mean	Lit.
Antartic region.....	2	0.4	(29)	Acid Extrusives			
Th mean =	2	2.6		Ash			
South Sea Islands.....	2	1.76	(26)	Krakatoa near Sumatra Th mean =	1	9.0	(82)
Sumatra (1) Bohemia (1).....	2	26.1	(35)	Kenite			
Loetschberg Tunnel, Switz.....	7	2.3	(83)	Antartic region.....	4	2.29	(29)
Various localities.....	63	2.7	(48)	Th mean =	4	12.0	
	1	1.63	(62)	Lavas			
	11	2.56	(123)	Various localities.....	18	3.4	(43)
Th mean =	86	20.5	(82)	Th mean =	15	24.0	
Monzonite				Liparite.....	2	4.7	(13)
Bella Monte, Tyrol, Austria.....	1	3.5	(13)	Phonolite			
Pegmatite				Kirchberg, Germany.....	1	0.9	(13)
Mysore State, India.....	2	4.17	(121)	Pitchstone			
Porphyry				Auckland Island, New Zealand.....	1	1.9	(26)
Campbell Is., New Zealand.....	1	2.8	(26)	Dutch East Indies.....	2	0.6	(13)
Various localities.....	10	2.8	(13)	Iale of Eigg, Scotland.....	1	1.53	(123)
Quartz				Meissen, Germany.....	1	3.0	(13)
Germany.....	3	16.0	(13)	Rhyolite			
Sumatra.....	1	1.3	(13)	Yellowstone Park, U. S. A.....	6	2.21	(104)
Syenite				Trachite			
Borneo and Molucca Island.....	13	1.58	(13)	Mt. Erebus, Antartic region.....	3	2.16	(29)
Mount Royal, Canada.....	1	1.1	(25)	Th mean =	3	13.0	
Vosges, France.....	1	13.2	(36)	Continental Europe.....	2	3.4	(13)
Norway.....	3	2.46	(123)	New Zealand.....	3	2.11	(26)
Various localities.....	8	8.3	(13)	Transandine Tunnel.....	7	0.58	(27)
	23	3.9	(48)	Th mean =	7	4.4	
Tinguaite				Various localities.....	18	3.0	(48)
Mount Royal, Canada.....	2	3.65	(25)	Tuff.....	2	2.9	(46)
Tinguaite porphyry				Transandine Tunnel.....	12	0.92	(27)
Germany.....	2	8.2	(13)	Th mean =	10	5.87	
Basic Intrusives				Basic Extrusives			
Diabase				Anamesite			
Borneo.....	2	0.85	(13)	Germany.....	2	1.8	(13)
Diabases and dolerites.....	8	1.0	(48)	Andesite			
New Zealand.....	1	0.43	(26)	Borneo and Molucca Is.....	13	1.58	(13)
Diabase and gabbro				Basalt			
Germany.....	5	2.8	(13)	Deccans and Antartic.....	14	2.0	(48)
Diorite				Mt. Erebus, Antartic region.....	1	2.13	(29)
Borneo and Sumatra.....	4	0.78	(13)	Th mean =	1	14.5	
Various localities.....	8	1.6	(48)	Hebrides (mainly).....	11	0.5	(48)
Dolerite				New Zealand.....	2	1.21	(26)
Isle of Canna, Scotland.....	1	0.57	(123)	Various localities.....	6	0.47	(123, 125)
New Zealand.....	2	0.66	(26)		6	2.2	(46)
Dunite					4	0.35	(126)
Loch Scavaig, Scotland.....	1	0.31	(123)	Lava			
Essexite				Antartic region.....	7	0.58	(29)
Mount Royal, Canada.....	1	0.26	(25)	Th mean =	7	4.7	
Gabbro				Vesuvius (1631-1906).....	7	12.6	(43, 46)
New Zealand.....	2	0.34	(26)	Th mean =	6	53.4	(82)
Gabbro and Norite.....	5	1.3	(48)	Limburgite			
Greenstone				Germany.....	1	2.9	(67)
Garrick Du, St. Ives, Eng.....	1	0.52	(123)	Melaphyre			
Hypersthenite.....	1	0.06	(121)	Oberstein, Germany.....	1	1.9	(13)
Peridotite				Tepharite.....	3	8.7	(67)
Isle of Rum, Scotland.....	1	0.63	(123)	Trap			
Porphyry				Mysore State, India.....	43	0.21	(121)
New Zealand.....	1	0.99	(26)				

METAMORPHIC ROCKS

Name and locality	Ra		Th		Lit.
	No. specimens	Mean	No. specimens	Mean	
Amphibolite India					
Mysore State.....	1	0.82			(121)
Gneiss					
Freiburg, Ger.....	1	2.9			(67)
Various localities.....	14	2.1	14	8.7	(48, 82)
Gneiss (granitic)					
Tauern Tunnel.....	11	3.41	7	17.7	(62)
Gneiss (porphyritic)					
Tauern Tunnel.....	9	4.34	9	41.0	(62)
Quartzite					
Various localities.....			6	3.4	(45)
Villnos Gulch, Austria....	1	54.7	1	5.79	(133)
Schist					
Lustre, Simplon Tunnel....			1	10.4	(45)
St. Gothard Tunnel.....	33	3.4	33	11.6	(47)
Schist (chlorite)					
Mysore St., India.....	1	0.27			(121)
Schist (hornblende)					
Mysore St., India.....	11	0.19			(131)
From mines, Mysore St., India.....	17	0.25			(121)
Slate					
England.....	2	1.17			(124)
European.....			10	13.5	(45)
Germany.....	2	1.3			(13)
Tauern Tunnel.....	3	2.53	3	24.3	(62)
Slate (mica)					
From well boring, Beachville, Can.....	1	1.6			(25)

SEDIMENTARY ROCKS

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Clay				
Montreal, Canada.....	2	1.17		(24)
England.....	3	0.79		(124)
England(1), Germany(1).....	2		10.2	(45)
Coal				
Alabama, U. S. A.....	11	0.166		(55)
Lens, France.....	1	0.97	3.3	(74)
Frankenholz.....	1	0.04	0.3	(74)
Coal ash				
Alabama coals.....	11	2.15		(55)
Lens, France.....	1	8.8	30.	(74)
Frankenholz.....	1	2.0	15.	(74)
Flint				
Terling, Essex, Eng.....	1	0.49		(124)
Grauwacke				
Wipperfurth, Germany.....	1		24.	(45)
Limestone				
Beachville, Ont., Can.....	6	1.02		(25)
Montreal, Canada.....	2	0.91		(25)
Deccan, India.....	1	0.25		(124)
England.....	7	1.13		(124)
Germany(2), Ireland(1).....	3		2.3	(44)
New Zealand.....	2	0.37		(26)
Various localities.....	30		0.4	(44)

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Limestone (oolithic)				
Yellowstone Park, U. S. A.....	2	2.9		(104)
Marble and limestone				
Various localities.....	8	1.3		(13)
Sand (Saxicava)				
Montreal, Canada.....	1	0.16		(24)
Sandstone				
From 850 ft. borehole, Baarlo, Limburg, Holland.....	2	1.04		(124)
Beachville, Canada.....	8	1.66		(13)
Various localities.....	1	0.50		(25)
	8		6.3	(45)

OCEANIC DEPOSITS

Name and locality	No. specimens	Ra mean	Lit.
Blue mud			
1240 fa. E. coast N. Amer.....	1	3.1	(138)
Calcareous mud			
2225 fa. E. of Society Islands.....	1	22.2	(138)
Globergina ooze			
1990 fa. Middle S. Atlantic.....	2	6.5	(138)
1825 fa. Pacific W. of South America....	1	7.4	(138)
570 fa. W. coast Ireland.....	2	6.3	(138)
2042 fa. Central Pacific.....	2	7.6	(138)
Radiolarian ooze			
Central Pacific.....	4	43.9	(138)
Red clay			
2740 fa. N. Atlantic, coast of Africa....	4	17.6	(138)
2350 fa. Central Pacific.....	3	47.4	(138)
"Salt Lime" (gypsum from evap. sea water)	1	0.016	(130)
Sea Salt.....	1	0.07	(124)
From evap. water of high seas.....	15	none	(40)

SOILS

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Gravel—fine siftings				
Terling, Essex, Eng.....	2	0.65		(124)
Surface loams				
7 localities in E. and S. parts of U. S. ...	7	1.97		(69)
Th mean =	5	4.5		(69)
Subsoils of above.....	7	1.52		(69)
Highest value for surface soils, 2.88; Lowest, 0.93				(69)
Highest value for subsoil, 3.8; Lowest 0.93				(69)
Loess, Heidelberg, 10.4×10^{-6} g Th per g				(45)
Mark, Ireland, 1.4×10^{-6} g Th per g				(45)

ROCKS FROM TUNNELS

Rock and section of tunnel	No. of specimens	Units	
		10^{-12} g Ra per g	10^{-6} g Th per g
The St. Gothard (47)			
Granites and gneiss			
Finsteraarhorn Massif.....	20	6.7	21.5
Altered sediments			
Unsernmulde.....	18	3.8	13.4
Tessinmulde.....	18	2.7	4.8
Schists, etc.			
St. Gothard Massif.....	33	3.4	11.6
The Tauern, Austria (62)			
Granitic gneiss.....	Ra 10, Th 7	3.41	17.7
Porphyritic granitic gneiss.....	Ra 13, Th 9	4.34	41.0

ROCKS FROM TUNNELS.—(Continued)

Rock and section of tunnel	No. of specimens	Units	
		10 ⁻¹² g Ra per g	10 ⁻⁶ g Th per g
Slate.....	Ra 3, Th 3	2.53	24.3
The Loetschberg, Bernese Oberland, Switzerland ⁽⁸³⁾			
Anhydrite.....	2	3.4	
Aplete.....	2	2.5	
Granite.....	7	2.3	
Limestone.....	16	1.5	
Quartz porphyry.....	1	2.5	
Quartz sandstone.....	1	4.3	
Schists			
Feldspathic.....	3	2.7	
Hornblende.....	2	3.1	
Lustre.....	2	3.4	
Mica.....	2	2.1	
Quartz.....	12	2.4	
Talc.....	16	1.5	
(Unclassified).....	16	2.5	
The Transandine, Argentine-Chile (27)			
Andesites.....	Ra 2, Th 1	0.71 0.79	4.1 5.6
Mean Ratio, Th-Ra = 7 × 10 ⁶			
Feldspathic Tuff.....	2	1.24	3.0
Trachytes.....	7	0.58	4.4
Tuff.....	Ra 8, Th 7	0.90	6.94

SPRING DEPOSITS

Country, name of spring, location	No. of specimens	Ra con- tent*	Th con- tent†	Remarks	Lit.
Austria					
Elizabethstollen, Gastein..	1	2920	3970	Reissacherite	(62)
Rudolphstollen, Gastein..	1	447,300	4988		(62)
Vilnos Gulch.....	4	75	37.7	A sinter	(133)
England					
Hot Springs, Bath.....	1	381			(124)
France					
Chomel, Vichy.....	1	250		Ferruginous	(52)
Hôpital, Vichy.....	1	700		Black	(52)
Carnot, Santenay.....	1	1500			(52)
Neris.....	1	950	5100	Black	(52)
Luxeuil.....	1	660	1100	Manganous	(52)
Germany					
Badochquelle.....	1	4		Surface scum	(67)
Ems, Hessen-Nassau.....	4	0.63	35		(133)
Johanngeorgenstadt, Sax- ony.	3	681	89	Mainly hy- dromor- phite; Range of Ra content, 10- 1300	(4)
Italy					
Fiuggi.....	1	5		Tufa	(84)
Russia					
Borzhom Spring.....	2	13.9	147		(14)
United States					
Hatborn No. 1, Saratoga Springs, N. Y.....	1	769			(71)

Country, name of spring, location	No. of specimens	Ra con- tent*	Th con- tent†	Remarks	Lit.
Geyser, Saratoga Springs, N. Y.....	1	17			(71)
Pump Well No. 4, Saratoga Springs, N. Y.....	1	63			(71)
Palace Spring, Hot Springs, Arkansas.....	1	1724			(99)
Avenue Spring, Hot Springs, Arkansas.....	1	140			(99)
Horseshoe Spring, Hot Springs, Arkansas.....	1	2.3			(99)
Various springs, Hot Springs, Arkansas.....	11	175			(99)
Main Springs, Mammoth Hot Springs, Yellow- stone.....	1	8.8		Travertine	(104)
Hot River, Mammoth Hot Springs, Yellowstone....	1	8.1			(104)
Bench Springs, Upper Geyser Basin, Yellow- stone.....	1	0.95			(104)
Fish Cone, West Thumb, Yellowstone.....	1	0.19			(104)
Fire Hole Lake, Lower Geyser Basin, Yellow- stone.....	1	6.7			(104)
Doughty Springs, Delta Co., Colorado.....	2	1654			(100)

* Unit, 10⁻¹²g Ra per g.† Unit, 10⁻⁶g Th per g.

METEORITES

Class and locality	Ra in 10 ⁻¹² g per g	Remarks	Lit.
Stony			
Dhurmshala, India.....	0.53		(123)
Coahuila, Coahuila, Mex.....	7.69	Normal hexahy- drite	(87)
Toluca, Xiquepelco, Mex.....	0.21	Medium octahe- drite	(87)
Iron			
Augusta Co., Va., U. S. A....	0.0022 none	2 specimens	(125) (123)
Stone			
Various localities.....	0.75	Mean of 16 Range 2.17-0.073	(87)
Iron			
Various localities.....	0.69 none	Mean of 2 Mean of 3	(87) (87)

NATURAL GASES

Source and Locality	No. sam- ples	Milli- micro- Curies (10 ⁻⁶ Curies) Ra per liter	Lit.
Canada			
Medicine Hat, Alberta.....	3	0.064	(97)
Suffield-Brooks Calgary.....	6	0.064	(97)

Source and Locality	No. samples	Milli-micro-Curies (10 ⁻⁹ Curies) Ra per liter	Lit.
3 British Columbia wells.....		0.47	(97)
Brant, Anondoga, Ontario.....	4	0.42	(97)
Tilbury, Ontario.....		0.016	(97)
England			
Marsh gas, environs of Cambridge...	10	0.3	(95)
France			
Alsace.....		7.1	(17)
Germany			
Nuengamme, Hamburg.....		0.24	(17)
Hungary			
Well No. 14, Bazna.....		0.043	(17)
Japan			
Well No. 22, Takiya.....		0.035	(44)
Rumania			
Well No. 103, Campina.....			(17)

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(For a key to the periodicals see end of volume)

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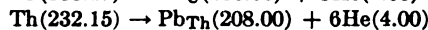
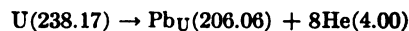
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AGES OF MINERALS AND ROCKS BASED ON RADIOACTIVE CHANGES

ROGER C. WELLS

There are a number of ways of estimating the ages of minerals by combining chemical and radioactive data, all based on the assumption that the law of each radioactive change is expressed by its constant, λ , over the periods and for the quantities of each element involved. The two principal methods employ the ratios of helium to uranium and thorium and of lead to uranium and thorium. The helium ratio is admitted to give minimum values on account of the loss of helium with lapse of time; and the lead ratio involves the assumption, or actual proof by means of an atomic weight determination, that the lead is wholly of radioactive origin. Associated rocks are generally assumed to be as old or older than the minerals found in them. Attempts have also been made to calculate the ages of rocks from determinations on bulk samples (Russell).

For the two methods mentioned the fundamental changes and data are:



One gram of uranium in equilibrium with its products gives 9.4×10^4 alpha particles per sec (15) or 1.96×10^{-11} gram He and 1.26×10^{-10} gram Pb_U per year.

One gram of thorium in equilibrium with its products gives 2.7×10^4 alpha particles per sec, or 5.5×10^{-12} gram He and 4.8×10^{-11} gram Pb_{Th} per year.

The ages of minerals may be calculated from the analytical data and the preceding information by simple proportion in the case of helium (equation 1) and also in the case of lead with sufficient accuracy for most purposes (equation 2), but if the percentage of lead is relatively large the theoretical relation is given by equation 3, where U, Th, Pb = percentage U, Th, Pb in the mineral.

$$(1) \text{ Age} = \frac{\text{cm}^3 \text{ He/g}}{U + 0.28Th} \times 910 \text{ million years}$$

$$(2) \text{ Age} = \frac{\text{Pb}}{\text{U} + 0.38\text{Th}} \times 7900 \text{ million years}$$

$$(3) \text{ Age} = \frac{\log(\text{U} + 0.38\text{Th} + 1.156\text{Pb}) - \log(\text{U} + 0.38\text{Th})}{6.5 \times 10^{-6}}$$

million years

Thorium minerals with Th/U greater than 3 are secondary

and younger than uranium minerals from the same geologic horizon⁽¹⁹⁾. Low lead ratios have little significance on account of the ease with which certain minerals abstract lead from circulating natural waters. The atomic weight of the lead should be determined whenever possible in order to make certain that the lead is of radioactive origin. In general, only primary minerals are suitable for age determinations.

AGES OF MINERALS FROM HELIUM RATIOS BY EQUATION (1)

(The values in parenthesis are calculated from the lead ratios for comparison)

Mineral	Geologic horizon	He cm ³ /g	U Percent	Th Percent	Age million years	Lit.
Phosphatic shark's teeth, Florida.....	Pliocene	1.7×10^{-6}	0.021	0	0.07	(23)
Phosphatic shark's teeth, Felixtowe, Eng.....	Pliocene	1.6×10^{-6}	0.013	0	0.11	(23)
Phosphatic nodules, Felixtowe, Eng.....	Pliocene	1.0×10^{-6}	0.0041	0	0.22	(23)
Carnotite, Montrose Co., Colo.....	Post Tertiary	0.01	2.53	0	3.6	(23)
Zircon, Campbell I., New Zealand.....	Tertiary	8.1×10^{-6}	0.029	0.07	1.5	(23)
Pitchblende, Joachimsthal.....		0.107	62.4	0	1.6	(23)
Sphaerosiderite, Germany.....	Oligocene	1.65×10^{-4}	0.00015	0.00017	7.6	(23)
Zircon, Mayen, Eifel.....	Tertiary	1.14×10^{-4}	0.0108	0.00073	9.4	(23)
Hematite, Co. Antrim, Ireland.....	Eocene	1.21×10^{-5}	0.00022	0.00073	26	(23)
Zircon, Auvergne.....	Tertiary	2.12×10^{-4}	0.031	0	6.2	(23)
Phosphatic nodules, Cambridge, Eng.....	Upper Cretaceous	3.0×10^{-5}	0.0091	0	3.0	(23)
Phosphatic nodules, Bedfordshire.....	Lower Cretaceous	2.1×10^{-5}	0.0049	0	3.9	(23)
Zircon, Cheyenne Canon, Colo.....	Paleozoic	0.0193	0.109	0.10	128	(23)
Hematite, Cumberland, Eng.....	Above Carboniferous	1.6×10^{-4}	0.0011	0	130	(23)
Limonite, Forest of Dean.....	Carboniferous	1.5×10^{-4}	0.00087	0.00043	140	(23)
Sipilite, Little Frier Mt., Va.....	Carboniferous (?)	0.59	2.42	4.33	147	(23)
Euxenite, Arendal, Norway.....	Pre-Cambrian	0.73	2.41	2.39	210(1240)	(23)
Samarskite, Mitchell Co., N. C.....	Carboniferous (?)	1.5	8.73	1.28	160	(23)
Phosphatic nodules, Bala, England.....	Silurian	1.5×10^{-4}	0.0028	0	49	(23)
Phosphatic limestone, Chirbury, Shropshire, Eng.....	Silurian	5.6×10^{-5}	0.0067	0	76	(23)
Uraninite, Katanga.....	Pre-Silurian	8.88	77.76	0	104(665)	(4)
Zircon, Brevig, Norway.....	Post-Devonian	0.0099	0.113	0.288	46	(23)
Hematite, Caen.....	Devonian	9.8×10^{-5}	0.00037	0.0013	120	(23)
Zircon, Green River, N. C.....	Paleozoic	0.0255	0.11	0.264	126	(23)
Zircon, Ural Mts.....	Paleozoic	0.030	0.0538	0.408	160	(23)
Uraninite, Colo.....	Tertiary	0.15	72.62		18(58)	(11)
Uraninite, N. C.....	Post-Cambrian	2.96	77.0	2.44	34(380)	(11)
Thorianite, Sab. Province, Ceylon.....	Pegmatite in Charnokite Series	1.5	9.87	63.54	50(460)	(5)
Thorianite, Galle Province, Ceylon.....	Pegmatite in Pre-Cam- brian	9.3	20.6	57.55	230(400)	(23)
Uraninite, Ånnerød.....	Pre-Cambrian (?)	9.4	66.2	5.27	120(890)	(11)
Uraninite, Portland, Conn.....	Devonian (?)	19.2	72.0	8.79	230(290)	(11)
Uraninite, Branchville, Conn.....	Silurian (?)	21.0	74.3	5.72	250(400)	(11)
Microlite, Amelia Court House, Va.....	Carboniferous (?)	0.05	1.60	0	280	(23)
Cuprouranite, Cornwall.....	Devonian	0.10	50.9	0	1.8	(23)
Orangite, Brevig, Norway.....	Middle Devonian	0.11	0.85	42.6	7.9(22)	(23)
Zircon, Ural Mts.....	Paleozoic	0.030	0.053	0.409	160	(23)
Thorianite, Ceylon.....	Balangoda series	8.9	11.0	67.7	270(500)	(23)
Zircon, Kimberly.....	Paleozoic	0.032	0.091	0.012	310	(23)
Phosphatic nodules, Loch Broom.....	Pre-Cambrian	8.3×10^{-6}	0.084	0	9.0	(23)
Gadolinite, Ytterby.....	Pre-Cambrian (?)	2.43	2.50	7.56	480	(23)
Aeschynite, Ural Mts.....		0.98	2.12	7.19	210	(23)
Cyrtolite, Llano Co., Texas.....	Pre-Cambrian (?)	1.15	3.11	4.44	240	(23)
Uraninite, S. Dak.....	Pre-Cambrian (?)	4.35	66.90	1.89	59(540)	(4)
Zircon, Ceylon.....	Ancient	0.0283	0.086	0.010	290	(23)
Zircon (?), Renfrew Co., Ontario.....	Archaeon	0.0114	0.0155	0.0008	660	(23)
Aeschynite, Hitteroe, Norway.....		1.09	7.98	1.11	1200	(23)

AGES OF MINERALS FROM LEAD RATIOS BY EQUATION (3)

Mineral	Geologic horizon	Pb Percent	U Percent	Th Percent	Th/U	Age million years	Lit.
Carnotite, Montrose Co., Colo.	Tertiary	0.17	45.6			29	(12)
Johannite, Colo.	Tertiary	0.76	47.2			123	(18)
Brannerite, Idaho.	Tertiary	0.18	46.97	4.1	0.11	29	(9)
Uraninite, Gilpin Co., Colo.	Tertiary	0.65	72.60			69	(11)
Thorite, Ceylon.	Young mineral in pegma- tite in Pre-Cambrian	2.86	72.00	8.79	0.12	280	(11)
Hatchettolite, Hybla, Ont.	Pre-Cambrian (?)	0.50	13.72	0.46	0.03	270	(24)
Polycrase, Brazil.	Pre-Devonian	0.59	5.49	4.59	0.84	600	(8)
Allanite, Blueberry Mtn., Mass.	Young mineral in pegma- tite	0.036	0.11	2.01	18.3	310	(17)
Freyalite, Brevig, Norway.	Post-Devonian (Lawson)	0.0028	0.0526	6.330	120.3	8.8	(19)
Tritomite, Brevig, Norway.	Post-Devonian (Lawson)	0.0026	0.0631	5.150	81.6	9.9	(19)
Thorite, Brevig, Norway.	Post-Devonian (Lawson)	0.0196	0.4072	29.20	71.7	13.3	(19)
Thorite, Brevig, Norway.	Post-Devonian (Lawson)	0.0810	0.7200	49.43	68.6	32.0	(19)
Thorite, Brevig, Norway.	Post-Devonian (Lawson)	0.0760	0.7000	47.25	67.5	31.4	(19)
Orangite, Brevig, Norway.	Post-Devonian (Lawson)	0.0570	1.2437	49.44	39.7	22.1	(19)
Orangite, Brevig, Norway.	Post-Devonian (Lawson)	0.0542	1.1825	45.03	38.1	22.8	(19)
Homolite, Brevig, Norway.	Post-Devonian (Lawson)	0.0121	0.2442	2.900	11.9	69.1	(19)
Mosandrite, Brevig, Norway.	Post-Devonian (Lawson)	0.0024	0.0432	0.287	6.64	112	(19)
Eudidymite, Brevig, Norway.	Middle Devonian	0.0007	0.0090	0.036	7.00	230	(19)
Eucolite, Brevig, Norway.	Middle Devonian	0.0012	0.0170	0.040	2.35	280	(19)
Thorite, Brevig, Norway.	Middle Devonian	0.4279	10.1040	14.20	1.41	210	(19)
Zircon, Brevig, Norway.	Middle Devonian	0.0055	0.1460	0.114	0.78	220	(19)
Zircon, Brevig, Norway.	Middle Devonian	0.0085	0.1941	0.082	0.42	280	(19)
Pyrochlore, Brevig, Norway.	Middle Devonian	0.0093	0.1855	0.075	0.40	330	(19)
Aegerine, Brevig, Norway.	Middle Devonian	0.0015	0.0253	0.007	0.28	400	(19)
Zircon, Brevig, Norway.	Middle Devonian	0.0370	0.9310	0.141	0.15	280	(19)
Biotite, Brevig, Norway.	Middle Devonian	0.0069	0.1602	0.017	0.11	310	(19)
Uraninite, Spruce Pine, N. C.	Post-Cambrian (?)	3.90	77.01	2.44	0.03	380	(11)
Thorianite, Galle Province, Ceylon.	Pegmatite in Pre-Cambrian	2.41	24.13	55.95	2.32	400	(19)
Betafite, Madagascar.	Pegmatite, uncertain	0.35	22.58	0.98	0.04	120	(16)
Thorianite, Sa. Province, Ceylon.	Pegmatite in Pre-Cambrian	2.09	9.87	63.54	6.45	460	(5, 19)
Uraninite, Branchville, Conn.	Silurian (?)	4.03	73.00	6.09	0.81	400	(11)
Uraninite, Katanga.	Pre-Silurian	6.51	77.76	0		620	(4)
Polycrase, Slättåkra, Sweden.		0.85	8.45	3.08	0.36	650	(2)
Uraninite, Ånnerød, Norway.	Pre-Cambrian (Moss dis- trict)	8.39	66.21	5.28	0.08	890	(11)
Uraninite, Elvestad.	Pre-Cambrian (Moss dis- trict)	9.35	65.82	7.46	0.11	970	(11)
Ånnerødite.	Pre-Cambrian (Moss dis- trict)	2.22	15.25	2.08	0.14	990	(2)
Mackintoshite, Llano Co., Tex.	Pre-Cambrian (?)	3.47	19.75	39.83	2.02	730	(1)
Yttrocrasite, Llano Co., Tex.	Pre-Cambrian (?)	0.45	2.28	7.69	3.38	640	(1)
Uraninite, Llano Co., Tex.	Pre-Cambrian	9.43	56.45	6.65	1.18	1130	(1)
Uraninite, Llano Co., Tex.	Pre-Cambrian	9.35	55.18	5.88	1.07	1150	(1)
Yttrialite, Llano Co., Tex.	Pre-Cambrian	0.74	1.45	9.53	6.5	1040	(1)
Yttrialite, Llano Co., Tex.	Pre-Cambrian	0.79	0.69	10.55	15.3	1190	(1)
Fergusonite, Ytterby, Sweden.	Middle Pre-Cambrian	0.18	1.06			1200	(1)
Gadolinite, Ytterby, Sweden.	Middle Pre-Cambrian	0.36	2.41			1100	(1)
Zircon, Ceylon.	Pre-Cambrian	0.092	0.56	0.01	0.02	1150	(14)
Uraninite, Villeneuve, Quebec.	Middle Pre-Cambrian	10.46	64.74	6.41	1.00	1110	(11)
Uraninite, Parry Sound, Ontario.	Middle Pre-Cambrian	10.83	69.19	2.83	0.04	1090	(6)
Uraninite, Arendal, Norway.	Pre-Cambrian (Arendal district)	10.16	61.27	3.65	0.06	1150	(11)
Uraninite, Black Hills, S. Dak.	Pre-Cambrian	15.24	66.90	1.89	0.03	1540	(4)

LITERATURE

(For a key to the periodicals see end of volume)

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SELECTED PHYSICAL PROPERTIES OF STARS AND NEBULAE

ALFRED H. JOY

CONTENTS.—(A) Classification of stellar and nebular spectra; (B) Stellar temperatures, masses, and densities; (C) Stellar diameters. (Data pertaining to the solar spectra will be found with other spectroscopic data; consult index.)

A. CLASSIFICATION OF STELLAR AND NEBULAR SPECTRA

The system¹ is that developed at Harvard College Observatory, as used by Miss Cannon in the Henry Draper Catalogue. Except where the exact nature of the spectral changes is not fully understood, decimal sub-classes, representing progressive steps toward the succeeding class, are used. In denoting objects by their catalogue numbers, the following abbreviations are used: B. D. = Bonn Durchmusterung; C. D. M. = Cordoba Durchmusterung; I. C. = Dreyer's Index Catalogue of nebulae and clusters; N. G. C. = New General Catalogue by Dreyer. The number, or numbers, following the abbreviation is the catalogue designation of the object.

Class P includes practically all the gaseous nebulae. Its unique characteristic is the appearance of lines from an unknown origin (nebulium). In addition there are many lines of H, He, C, He+, C+, and N+. All lines are bright and usually sharp. (The order of the Harvard (2) subdivisions should probably be reversed to indicate decreasing intensity of radiation.)

Class	Typical object	Spectral criteria
Pa	I. C. 418	$\lambda 5007$ and $\lambda 4959$ faint, $\lambda 3869$ not seen
Pb	Orion nebula	$\lambda 5007$ and $\lambda 4959$ stronger
Pc	I. C. 4997	$\lambda 4363$ conspicuous
Pd	N. G. C. 6826	$\lambda 5007$ and $\lambda 4959$ strong
Pe	N. G. C. 7662	$\lambda 4686$ present
Pf	N. G. C. 40	$\lambda 4686$ strong

Wright (¹¹) has divided these spectra into three classes: Class I, having $\lambda 4686$ present, Class II, with $\lambda 4686$ absent but $\lambda 3869$ present, and Class III with both $\lambda 4686$ and $\lambda 3869$ absent.

Class O is distinguished by the presence of the Pickering series of ionized helium, upon a strong continuous spectrum with maximum intensity far in the violet. The elements present are H, He, He+, C+, N+, Mg+, O+, CIII, NIII, SiIII, OIII, SiIV. Broad emission bands occur in the earlier subdivisions. Few absorption lines are found in sub-classes Oa, Ob, Oc, which make up the group known as Wolf-Rayet stars. (The Harvard sub-classes Od, Oe, and Oe5 which have absorption lines and in some cases narrow emission lines as well, are included in the subclasses O5 to O9 as suggested by H. H. Plaskett (⁷), the basis of classification being the absorption lines.)

¹ Adopted by International Astronomical Union. It defines a temperature scale which is linear within the present errors of measurement.

Class	Typical object	Spectral criteria
Oa	B. D. +35° 4013	Band $\lambda 4648$ stronger than $\lambda 4686$
Ob	B. D. +35° 4001	$\lambda 4686$ stronger than $\lambda 4648$
Oc	C. D. M. -41° 10972	Bands narrower. $\lambda 4686$ twice $\lambda 4638$
O5	B. D. +4° 1302	Pickering series very strong. H lines weak, $\lambda 4634$ and $\lambda 4640$ (NIII) present
O6	B. D. +44° 3639	Neutral helium appears
O7	9 Sagittae	$\lambda 4471$ (He), $1.4 \times \lambda 4541$. $\lambda 4089$ (SiIV), $0.8 \times \lambda 4097$ (NIII)
O8	λ Orionis	$\lambda 4481$ (Mg+) appears
O9	10 Lacertae	H stronger, He weak. $\lambda 4471$, $2.7 \times \lambda 4541$. $\lambda 4089$, $1.4 \times \lambda 4097$

Class B is characterized by the presence of helium, which has its maximum intensity in B2. The principal elements are those of class O, with the addition, in the later sub-classes, of lines of the ionized atom of several of the metals, such as Sr, Ba, and Fe. The H and K lines of calcium are found in increasing strength in this class. The hydrogen lines increase through the sub-classes, reaching a strong maximum at Ao of the following class.

Class	Typical object	Spectral criteria
B0	ζ Orionis	Pickering series weak, $\lambda 4649$ (OII), $\lambda 4116$ (SiIV), and $\lambda 4089$ (SiIV) maximum intensity
B1	β Canis Majoris	He more prominent than O and Si.
B2	γ Orionis	$\lambda 4116$ not seen. $\lambda 4089$ and $\lambda 4649$ faint
B3	η Aurigae	Strongest lines are helium
B5	q Tauri	$\lambda 4128$ and $\lambda 4131$ (SiII) stronger than $\lambda 4121$ (He). $\lambda 4481$, $0.7 \times \lambda 4471$
B8	β Orionis	$\lambda 4481$ equal to $\lambda 4471$
B9	λ Aquilae	H strong. He weak. Several prominent enhanced metallic lines

Classes A, F, G, K and M, which contain the largest numbers of the stars, show a gradual increase in the number and intensity of the lines of neutral metallic elements of the lower atomic weights, and a decrease in the intensity of lines due to ionized elements. Compounds produce bands in the later classes. The sun's spectrum is Go, and is intermediate between that of the white and the red stars.

Class	Typical object	Spectral criteria
Ao	α Lyrae	H maximum strength. Very few other lines except $\lambda 4481$ (Mg+)
A5	ρ Sagittarii	K (Ca+) stronger than H δ . $\lambda 4290$ well marked. $\lambda 4481$ weaker
Fo	σ Bootis	K $3.0 \times$ H δ and equal to H + H ϵ

Class	Typical object	Spectral criteria
F5	α Canis Minoris	Fraunhofer band G first seen. Numerous solar lines
G0	α Aurigae	Solar type. H not conspicuous. G band well defined, $H\delta = \lambda 4226$.
G5	η Piscium	$H\gamma$ fainter than $\lambda 4325$
K0	α Bootis	G band conspicuous, $\lambda 4226$ strong. Hydrogen weaker
K5	α Tauri	$\lambda 4226$ very wide. $\lambda 4254$ and $\lambda 4274$ (Cr) strong. Titanium bands very faint
M0	β Andromedae	Titanium bands well marked
M5	α Herculis	Titanium bands very strong. Metallic lines fewer

Class R and N stars show the carbon bands in increasing strength. The more advanced stars of class N have very little light in the violet or blue portions of the spectrum. They are the reddest stars known. Typical stars: Class R, B. D. $-10^\circ 5057$; Class N, 19 Piscium.

Class S spectra resemble those of class K5 except for the presence of bands of zirconium, and other peculiarities in the region near $\lambda 4650$. The line $\lambda 4554$ of Ba + is conspicuous.

Class Q stars are the novae. Near maximum of outburst their spectra are characterized by numerous wide emission bands of hydrogen and helium, and by absorption lines of ionized elements, especially titanium and iron. As the star decreases in light, both absorption and emission lines of N and O become more prominent. In the later stages, bright nebular bands appear; these are ultimately superseded by the bright bands of the Wolf-Rayet spectrum.

B. STELLAR TEMPERATURES, MASSES, AND DENSITIES

Giant stars are characterized by large mass, low density, and great total luminosity. Dwarf stars have smaller mass, higher density, and less total luminosity. Both are found in all classes, but the greatest contrasts between the two are found in the cooler stars of classes K and M. The continuous spectrum of dwarfs has its maximum shifted towards the violet, as compared with that of giants of the same spectral class, indicating that their absolute temperature is about 15% higher than that of the giants. Even with small dispersion, pronounced differences between giants and dwarfs may be noticed in the distribution of intensity in their line spectra. These differences probably arise from differences in the density gradients; they show a correlation with the absolute magnitude and mass of the stars. The low densities of giants favor the enhancement of those lines (absorption) which are produced under conditions of high excitation, such as the spark lines of the metals; the high density of dwarfs favor those produced by low excitation, such as the resonance lines of neutral atoms. The lines $\lambda 4077$, $\lambda 4215$ (ionized Sr) are much strengthened in giants, and weakened in dwarfs; the reverse is true of $\lambda 4226$ (Ca), $\lambda 4454$ (Ca), $\lambda 4607$ (Sr).

STELLAR TEMPERATURES, MASSES AND DENSITIES

Units: Temperature, 1000°C abs.; Mass, Mass of Sun; Density, g/cm^3 .

Class	Effective temperature (giants*)					Mean mass (g)		Mean density (g)	
	A†	P†	C‡	S||	F¶	Giants	Dwarfs	Giants	Dwarfs
Oa		23		23					
O5					30	50 (g)			
B0		20	13	18	19	10			
B3					16	9			0.22
B8	16					7.3			0.24
A0	14	11	8	12	10	7.0	6.0	0.16	0.36
A5		9				5.6	4.0	0.071	0.40
F0		7.5		9	7.5	4.3	2.5	0.025	0.40
F5	6	7.2	6			3.2	1.5	0.0078	0.39
G0	5.8	6.5	6	7	6	2.6	1.0	0.0025	0.68
G5		4.5				2.8	0.76	0.00087	1.2
K0		3.7	4		4.5	3.0	0.68	0.00018	1.3
K5	3	3.5	3.5		3.9	2.6	0.62	0.00026	1.4
M0		3	3	5	3	2.0	0.59	0.000096	5.4
M5	2.5	2.95		4					
N		2.3							

* Temperatures of dwarfs are 10% to 20% higher than giants of same class (indirect methods).

† Abbot (1). By radiometer.

‡ Potsdam observations. Wilsing *et al.* (10).

§ Coblentz (3). By thermocouple.

|| Saha (6). Calculated from initial appearance of certain spectral lines under pressure of 0.1 atmosphere. (See note ¶.)

¶ Fowler and Milne (4). Calculated from maximum intensity of certain spectral lines under pressure of 1.31×10^{-4} atmospheres, assuming 10 000° corresponds to maximum of Balmer lines of H. These temperatures, and those of Saha, are for the reversing layer; true effective temperature is somewhat higher.

STELLAR DIAMETERS

Unit: Linear Diameter, 10^6 km.

Star	Class	Parallax	Diameter	
			Angular*	Linear
α Tauri.....	K5	0.055"	0.022"	60
α Orionis.....	M2	0.019	0.044	347
α Bootis.....	K0	0.088	0.022	37
α Scorpii.....	M1	0.017	0.040	353

* Measured by means of interferometer (5).

LITERATURE

(For a key to the periodicals see end of volume)

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DISTRIBUTION OF STARS

FREDERICK H. SEARES

Restriction.—No account is here taken of globular star clusters nor of stars included in spiral nebulae, many of which contain objects whose essentially stellar character can no longer be doubted.

Apparent Distribution and Number.—Statistically considered, the stars are distributed over the face of the sky with a high degree of regularity, their numbers gradually increasing as the Milky

Way is approached from either side. The Milky Way defines what is very nearly a plane of symmetry, and for a first approximation, systematic difference between the two hemispheres, progressive changes in galactic longitude, and all local irregularities can be ignored. The resulting mean distribution, as found by Seares and van Rhijn, is shown in Table 1.

To apparent magnitude (see p. 39) $m = 13.5$ the results depend on data covering a large portion of the sky. From $m = 13.5$ to 18.5 they are derived from counts of stars on photographs of the 139 Selected Areas of Kapteyn between the North Pole and declination -15° . For still higher values of m , the values of $\log N_m$ are extrapolated, but the uncertainty consequent to the extrapolation itself is probably small. Excepting in low galactic latitudes, there is little or no systematic uncertainty arising from the particular choice of fields used for the counts. To $m = 16$ the magnitude scale is the mean of several closely accordant determinations made at different observatories, and is probably accurate within a few hundredths of a magnitude. Below this limit the scale depends wholly upon observations made at the Mount Wilson Observatory. Although this part of the scale has not been confirmed by independent measures made elsewhere, it

has been established by methods successfully used for the brighter stars.

The indicated total, to the twenty-first photographic magnitude, of all stars in the sky is 890 000 000, and to the twentieth visual magnitude, 1 000 000 000. Barring losses of light by absorption, scattering etc., the increase in $\log N_m$ for a uniform distribution of stars throughout space would be 0.6 per unit of magnitude. The observed increase nowhere attains this value; the stars thin out with increasing distance from the sun, and at great distances they thin out more rapidly than near the sun; these changes are most pronounced in the direction of the poles of the Milky Way. If the law of decreasing space density indicated by the stars accessible to observation holds for those beyond present telescopic reach, the total number of luminous stars in the galactic system must be of the order of 3×10^{10} .

TABLE 1.—LOGARITHMS OF NUMBERS (N_m) OF STARS, OF MAGNITUDES LESS THAN m , PER SQUARE DEGREE IN DIFFERENT GALACTIC LATITUDES ⁽¹⁾

Units: Last column; m = visual magnitude; average $N_m = 1$, if $m = 8$. Other columns; m = international photographic magnitude (2); $N_m = 1$, if $m = 8$, Lat. = 0. Galactic pole: R. A. $12^h 41^m 20^s$, Dec. $+27^\circ 21'$ (1875) (Gould).

m	$\text{Log}_{10} N_m$ at latitude															Log_{10} (average N_m) between latitudes				
	0°	5°	10°	15°	20°	25°	30°	35°	40°	50°	60°	70°	80°	90°	0°– 20°	20°– 40°	40°– 90°	0°– 90°	0°– 90° (v)	
4.0	2.19	2.17	2.12	2.05	3.99	3.93	3.87	3.82	3.78	3.74	3.71	3.69	3.67	3.66	2.12	3.88	3.73	3.94	2.11	
4.5	2.42	2.40	2.35	2.28	2.22	2.16	2.10	2.05	2.01	3.97	3.94	3.92	3.90	3.88	2.35	2.11	3.96	2.17	2.35	
5.0	2.65	2.63	2.58	2.51	2.45	2.39	2.33	2.28	2.24	2.20	2.17	2.15	2.13	2.12	2.58	2.34	2.19	2.40	2.60	
5.5	2.88	2.86	2.80	2.74	2.68	2.62	2.56	2.51	2.47	2.43	2.40	2.38	2.36	2.34	2.80	2.57	2.41	2.63	2.83	
6.0	1.11	1.08	1.03	2.97	2.90	2.84	2.79	2.74	2.70	2.65	2.62	2.60	2.58	2.57	1.03	2.80	2.64	2.85	1.07	
6.5	1.33	1.31	1.26	1.19	1.13	1.07	1.01	2.97	2.92	2.88	2.85	2.83	2.80	2.79	1.26	1.03	2.86	1.08	1.31	
7.0	1.56	1.53	1.48	1.42	1.35	1.29	1.24	1.19	1.15	1.10	1.07	1.05	1.02	1.01	1.48	1.25	1.09	1.30	1.54	
7.5	1.78	1.76	1.70	1.64	1.57	1.52	1.46	1.41	1.37	1.32	1.29	1.27	1.24	1.23	1.70	1.47	1.31	1.52	1.77	
8.0	0.00	1.98	1.92	1.86	1.79	1.74	1.68	1.64	1.59	1.54	1.51	1.48	1.46	1.44	1.92	1.69	1.53	1.74	0.00	
8.5	0.23	0.20	0.14	0.08	0.01	1.95	1.90	1.85	1.81	1.76	1.73	1.69	1.67	1.65	0.14	1.91	1.74	1.96	0.23	
9.0	0.45	0.42	0.36	0.29	0.22	0.17	0.12	0.07	0.03	1.98	1.94	1.90	1.88	1.86	0.36	0.13	1.96	0.18	0.45	
9.5	0.67	0.64	0.57	0.50	0.44	0.38	0.33	0.28	0.24	0.19	0.15	0.11	0.08	0.06	0.58	0.34	0.16	0.39	0.68	
10.0	0.89	0.85	0.79	0.72	0.65	0.59	0.54	0.50	0.45	0.40	0.35	0.30	0.28	0.26	0.79	0.55	0.37	0.60	0.90	
10.5	1.10	1.07	1.00	0.93	0.86	0.80	0.75	0.70	0.66	0.60	0.55	0.50	0.47	0.45	1.00	0.76	0.57	0.81	1.11	
11.0	1.32	1.28	1.21	1.14	1.06	1.01	0.96	0.91	0.86	0.80	0.74	0.69	0.65	0.64	1.22	0.96	0.76	1.02	1.32	
11.5	1.53	1.49	1.42	1.34	1.27	1.21	1.16	1.11	1.06	0.99	0.92	0.87	0.84	0.82	1.43	1.17	0.95	1.22	1.53	
12.0	1.74	1.70	1.63	1.54	1.47	1.41	1.36	1.30	1.25	1.18	1.11	1.05	1.01	1.00	1.63	1.36	1.14	1.42	1.74	
12.5	1.96	1.91	1.83	1.75	1.67	1.61	1.55	1.49	1.44	1.36	1.28	1.23	1.18	1.17	1.84	1.56	1.32	1.62	1.94	
13.0	2.16	2.12	2.04	1.95	1.87	1.80	1.74	1.68	1.62	1.54	1.46	1.39	1.35	1.33	2.04	1.75	1.50	1.82	2.14	
13.5	2.37	2.32	2.24	2.14	2.06	1.99	1.92	1.86	1.80	1.71	1.62	1.56	1.51	1.49	2.24	1.93	1.67	2.01	2.34	
14.0	2.57	2.52	2.43	2.34	2.24	2.17	2.10	2.03	1.97	1.88	1.78	1.72	1.67	1.65	2.44	2.11	1.83	2.20	2.52	
14.5	2.77	2.72	2.63	2.52	2.43	2.34	2.27	2.20	2.14	2.04	1.94	1.87	1.82	1.80	2.63	2.29	1.99	2.38	2.71	
15.0	2.96	2.91	2.82	2.71	2.60	2.51	2.44	2.36	2.30	2.19	2.09	2.01	1.96	1.94	2.82	2.45	2.14	2.56	2.89	
15.5	3.15	3.10	3.01	2.89	2.77	2.68	2.60	2.52	2.45	2.34	2.24	2.15	2.10	2.08	3.01	2.62	2.29	2.73	3.07	
16.0	3.33	3.28	3.19	3.07	2.94	2.84	2.75	2.67	2.60	2.48	2.37	2.29	2.23	2.21	3.19	2.77	2.43	2.90	3.24	
16.5	3.51	3.46	3.37	3.24	3.10	2.99	2.90	2.81	2.74	2.61	2.50	2.42	2.36	2.34	3.37	2.92	2.56	3.07	3.40	
17.0	3.68	3.64	3.54	3.41	3.26	3.14	3.04	2.95	2.87	2.74	2.63	2.54	2.48	2.46	3.54	3.07	2.69	3.23	3.56	
17.5	3.85	3.81	3.71	3.57	3.41	3.28	3.17	3.08	3.00	2.86	2.75	2.66	2.60	2.57	3.70	3.20	2.81	3.39	3.71	
18.0	4.01	3.97	3.87	3.73	3.56	3.42	3.30	3.20	3.12	2.98	2.86	2.77	2.71	2.68	3.86	3.34	2.93	3.54	3.86	
18.5	4.16	4.12	4.03	3.88	3.70	3.55	3.42	3.32	3.23	3.08	2.97	2.88	2.82	2.79	4.02	3.46	3.04	3.68	4.00	
19.0	4.32	4.28	4.18	4.02	3.84	3.67	3.54	3.43	3.34	3.19	3.08	2.98	2.92	2.89	4.17	3.59	3.14	3.82	4.13	
19.5	4.46	4.42	4.32	4.16	3.97	3.79	3.65	3.53	3.44	3.29	3.17	3.07	3.01	2.98	4.31	3.70	3.24	3.96	4.26	
20.0	4.60	4.56	4.46	4.29	4.09	3.90	3.75	3.63	3.53	3.38	3.26	3.16	3.10	3.07	4.45	3.81	3.33	4.09	4.38	
20.5	4.74	4.69	4.59	4.42	4.21	4.01	3.85	3.72	3.62	3.46	3.34	3.25	3.18	3.15	4.58	3.91	3.42	4.21		
21.0	4.87	4.82	4.72	4.54	4.33	4.11	3.94	3.81	3.70	3.54	3.42	3.33	3.26	3.22	4.71	4.01	3.50	4.33		

Distribution of Intrinsic Brightness.—The range in intrinsic brightness among stars is enormous—at least twenty magnitudes, corresponding to an intensity ratio of 100 000 000 to 1. A knowledge of the frequencies of different luminosities among the stars in a given volume of space is essential (unless questionable assumptions are to be introduced) for the calculation of the space distribution of the stars. It is, however, difficult to obtain, and,

at present, the frequencies are but imperfectly known. By assuming that the mean parallaxes of stars of apparent magnitude m and proper motion μ can be represented by a linear function of m and $\log \mu$ supposed to be valid for all magnitudes and proper motions, Kapteyn and van Rhijn derived for the distribution of the absolute magnitudes a Gaussian error curve whose ordinates are given in the second column of Table 2. Seares ⁽⁴⁾ has shown

that their adopted mean parallax formula does not represent the distances of the stars of large motion and faint apparent magnitude, all of which are of low luminosity. A revision of the parallax formula, still only provisionally determined, and a recalculation of the luminosity function from about 500 stars of large proper motion leads to the frequencies in the third column of Table 2.

TABLE 2.—APPROXIMATE LUMINOSITY FUNCTION

$\phi(M)$ = number of stars, absolute magnitude M , per cubic parsec in the neighborhood of the sun. Unit of distance for M is 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12} km.

M	10 + Log ₁₀ $\phi(M)$		Diff.
	Kapteyn v. Rhijn (3)	Seares (4)	
-4.64	2.61		
-3.64	3.42		
-2.64	4.17		
-1.64	4.85		
-0.64	5.46	5.58	0.12
+0.36	6.00	6.16	0.16
1.36	6.47	6.66	0.19
2.36	6.88	7.05	0.17
3.36	7.21	7.34	0.13
4.36	7.47	7.58	0.11
5.36	7.67	7.74	0.07
6.36	7.80	7.84	0.04
7.36	7.85	7.87	0.02
8.36	7.84	7.86	0.02
9.36	7.76	7.88	0.12
10.36	7.61	7.92	0.31
11.36	7.39	8.06	0.67
12.36	7.10	8.11	1.01
13.36	6.75	8.11	1.36
14.36	6.3	8.13	1.8

For the stars of low luminosity, the departure of Seares' curve from the error curve, shown by the differences in the fourth column, is important and must be accepted as real, although quantitatively the results are still very uncertain. The possibility of a maximum within the range of absolute magnitude considered is not excluded, but any such maximum must be well below the Kapteyn-van Rhijn limit, $M = 7.7$. Since the frequencies of stars of very low luminosity are still unknown, it is impossible at present to express the luminosity function as a true frequency function.

Space Distribution of Stars.—The space distribution is defined by a density function, preferably in a form expressing the total number of stars per unit volume at different distances from the sun. At present, however, we must be content with so expressing the number of stars which are brighter than some limit of absolute magnitude.

Analytically, the problem is to determine the density function, $\Delta(\rho)$, from the integral equation

$$\frac{dN_m}{dm} = \omega \int_0^\infty \phi(M) \Delta(\rho) \rho^2 d\rho$$

where the left hand member can be found from the data in Table 1; ω is a constant, ρ = distance from sun. Since $\phi(M)$, for $M > 8$, is still very uncertain, the general solution cannot be found at present. Values of the density for the neighborhood of the sun (Table 3) can, however, be calculated incidentally in deriving the data in Table 2. Results in the second column of Table 3 ($M = 7.86$) are in good agreement with similar results by Kapteyn and van Rhijn; the other tabular values indicate what is to be expected for lower limiting values of M . The uncertainty of the luminosity function for $M > 8$ scarcely justifies the effort required to complete the table.

TABLE 3.—AVERAGE NUMBER OF STARS, BRIGHTER THAN ABSOLUTE MAGNITUDE M , PER CUBIC PARSEC AT DISTANCE ρ FROM SUN (4)

Unit of ρ is 1 parsec; of distance for M , 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12} km.

$\log_{10} \rho$	M	7.86	8.86	9.86	10.86	11.86	12.86	13.86	14.86
0.9		0.028	0.035	0.042	0.050	0.060	0.073	0.087	0.098
1.1		.026	.033	.040	.048	.058	.069	.078	
1.3		.024	.030	.035	.041				
1.5		.023	.028	.033					
1.7		.022							
1.9		.020							
2.1		.017							
2.3		.014							
2.5		.011							
2.7		.008							
2.9		.004							

(Values based upon $\phi(M)$ for stars near the sun, and on the assumption that the relative frequencies of M are the same at all distances.)

Average densities for the whole sky give a very imperfect picture of the real distribution in space, as the latter varies greatly with galactic latitude. Broadly speaking, the surfaces of equal space density are concentric, and approximately similar, ellipsoids of revolution, similarly situated, with axes in the ratio of about 5 to 1. See Table 4.

TABLE 4.—RADII OF EQUIDENSITY ELLIPSOIDS (6)

$\Delta(\rho)$ = number of stars per cubic parsec at distance ρ from sun. (Values require revision for recent star counts (Table 1) and for error in luminosity function (cf. Table 2)).

Unit of radius = 1 parsec. 1 parsec = 3.26 light years = 30.8×10^{12} km. Latitude is galactic.

$\Delta(\rho)$	Latitude	
	90°	0°
1.00	0	0
0.63	118	602
0.40	198	1010
0.25	296	1510
0.16	413	2106
0.100	553	2820
0.063	717	3656
0.040	902	4600

Size of the Galactic System.—At present we have no certain indication as to the distance of the most remote stars belonging to the galactic system; but if ordinary blue stars of absolute magnitude zero occur among the faintest objects listed in Table 1, the diameter of the system cannot be less than a million light years. Such objects are not to be expected in high galactic latitudes, where the stars of very faint apparent magnitude are almost certainly all dwarfs; but their occurrence in the Milky Way is by no means excluded. We have, indeed, strong, though not conclusive, evidence of the existence in the Milky Way of stars of zero absolute magnitude among those of the sixteenth apparent magnitude. The corresponding diameter of the system is a hundred thousand light years. This value may be accepted with some assurance as a lower limit for the size of the system in the plane of the Milky Way, exclusive of such objects as globular star clusters and spiral nebulae, whose relation to the general stellar system about us is not yet clearly defined.

Position of the Sun.—The symmetrical distribution of stars adopted in Table 1 tacitly assumes the sun to be at the center of the system. This is not actually the case, as is shown by systematic deviations from the adopted mean distribution. Shapley's (5)

value for the distance of the sun from the galactic plane is about 60 parsecs, to the north, which is certainly of the right order of magnitude. The sun's distance from the center is much less certain, and different estimates range from a few hundred to many thousand parsecs, according to the underlying assumptions and the method of attack. The question is much complicated by the fact that the sun lies within a local cluster whose members form a considerable fraction of the stars of the brighter apparent

magnitudes, and a final answer must await the detailed discussion of the distribution of faint stars in galactic longitude.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Seares and van Rhijn, 197, 11: 358; 25; a more detailed account appears in 21, 62: 320; 25. (²) *Trans. Internat. Astronomical Union*, 1: 69; 26. (Standard magnitudes of stars.) (³) Kapteyn and van Rhijn, 21, 52: 23; 20. (⁴) Seares, 21, 59: 310; 24. (⁵) Shapley, 21, 49: 333, 19. (⁶) Kapteyn, 21, 55: 302; 22.

DISTRIBUTION OF NEBULAE

FREDERICK H. SEARES

The term nebula is applied to objects of such diversity of form, size, distance, and physical characteristics that any study of their distribution presupposes a consideration of the question of classification. The following general classification by Hubble provides for two mutually exclusive divisions, characterized by position in the sky as well as by physical peculiarities, and five sub-classes representing physical differences.

A GENERAL CLASSIFICATION OF NEBULAE

- I. **Galactic nebulae**, characterized by (1) tendency to concentrate about the Milky Way, (2) conspicuous association with individual stars from which they probably derive their luminosity, (3) early-type spectra, either emission or absorption, depending upon the spectral type of the associated stars, and (4) smooth and cloudy or wispy texture. They include
 - (a) *Planetary*, distinguished by symmetrical distribution of nebulosity about central stars, sharply defined edges, and emission spectra.
 - (b) *Diffuse nebulae*, clouds in low galactic latitudes, usually associated with early-type stars. This type ranges from luminous to dark and from semi-transparent to opaque. Subdivided into predominantly luminous, predominantly obscure, and conspicuously mixed.
- II. **Non-galactic nebulae**, characterized by (1) tendency to avoid the Milky Way, (2) no conspicuous association with stars, (3) late-type absorption spectra, and (4) usually a rotational symmetry about dominating non-stellar nuclei. They include
 - (a) *Elliptical nebulae*, amorphous objects whose forms can be represented as successive stages of an original globular mass flattening under the influence of increasing rotation.
 - (b) *Spirals of two kinds, logarithmic and barred*, which, once formed, appear to develop along parallel lines, the arms unwinding and the granulation of the material becoming more and more conspicuous.
 - (c) *Irregular nebulae*, including a few non-galactic objects having no dominating nuclei and, significantly, showing no rotational symmetry.

Physically, the planetaries and diffuse nebulae, Ia and Ib, are distinct and apparently without genetic relationship, except that the planetaries, which, in some cases at least, seem to be late stages in the development of novae, may represent the catastrophic consequences of the penetration of a star within a nebulous cloud of the diffuse sub-class. The spirals IIb, on the other hand, are apparently an evolutionary development from elliptical nebulae, IIa, although it does not follow that all elliptical nebulae will necessarily become spirals. The few irregular nebulae, IIc, present features that might be expected in the case of spirals in the absence of or through the neutralization of dominating dynamical characteristics.

The distribution of the various classes of nebulae is not in general easily shown in tabular form. The following summary for each of the important sub-classes includes, however, references to diagrams which exhibit the main features of the distribution.

Ia. Planetary Nebulae.—In the whole sky only about 150 of these objects are known, many of which are so small as to be recognizable only from their gaseous emission spectra. The smallest objects are closely associated with the Milky Way, and show a marked concentration in the Aquila-Sagittarius region. With increasing size the mean galactic latitude increases, and the largest known objects, to the extent of a dozen or so, are scattered over the sky with some approach to uniformity (³, 6, 11). This suggests that the linear distances of planetaries from the galactic plane are relatively small and that their angular diameters are correlated with their distances from the sun. Very small nebulae thus appear in low galactic latitudes because their distances from the sun are many times their distances from the galactic plane.

The actual distances of planetary nebulae are still very uncertain. Van Maanen (¹⁵) has measured the parallaxes of about 20 of these objects and finds distances ranging from 50 to a few hundred parsecs; but, as he points out, these values are in conflict with the fact that the radial velocities average about 30 km/sec, while the proper motions are apparently small, of the order of the parallaxes themselves.

Ib. Diffuse Nebulae.—The distant star clouds of the Milky Way define the galactic circle. A secondary galaxy, inclined some 12° to the galactic circle proper, is outlined by the bright helium stars of the much-flattened local cluster immediately surrounding the sun, most of whose members are within 500 parsecs (¹⁴). The diffuse nebulae outside the Magellanic Clouds, some hundreds in all,¹ are closely associated with the primary and secondary galactic circles (⁷). Since the mean galactic latitude of those following the primary galaxy is only about 2°, and since the space within the two circles is not well filled, the inference is that these nebulae are directly connected either with the Milky Way star clouds or with the local cluster, and that few are to be found in the intervening regions. We thus have a group of diffuse nebulae whose members are within a few hundred parsecs of the sun; the others, forming a widely scattered group associated with the Milky Way, are at distances probably to be counted in thousands of parsecs (¹⁰). Both groups include both luminous and dark nebulae; the luminous members of the two groups present somewhat different physical characteristics, most marked in their spectra, which may be either emission, or predominantly continuous or absorption in type. The continuous and absorption spectra occur mostly among the nearer objects connected with the local cluster. The luminous diffuse nebulae are conspicuously associated with stars of high temperature from which they derive their luminosity, either by excitation or reflection.

II. Non-galactic Nebulae.—The members of this class, consisting chiefly of the related sub-classes, elliptical nebulae (IIa) and spirals (IIb), are far more numerous than the galactic nebulae. On the whole, the elliptical nebulae outnumber the spirals many times; but if only bright objects are considered, the spirals are the more numerous. The distribution in galactic latitude is shown in

¹ Less than 200 luminous ones known; no complete list published (r. 7, 8). Most complete list of dark nebulae (182 small objects) is given by Barnard (¹).

Table 1, which gives to limiting magnitude 18.6 on the international photographic scale the average number per square degree at various latitudes in each hemisphere. The data are compiled from Fath's list (⁴), based on Mount Wilson photographs (exposure time 1 hour with 60-inch reflector) of the 139 Selected Areas between the North Pole and declination -15° . That part of the northern galactic hemisphere within which nebulae are frequent is wholly covered. About one-half the southern hemisphere is included, but not the south pole itself. Fath's counts have been corrected for losses caused by poor definition in the corners of the negatives (¹³).

TABLE 1.—NON-GALACTIC NEBULAE: NUMBER PER SQUARE DEGREE(⁴)

Average number; international photographic magnitude ≤ 18.6 ; cf. Table 2.

Galactic latitude	Hemisphere	
	N	S
5°	0.2	0.0
15	0.8	0.4
25	2.5	5.4
35	13.2	8.2
45	10.3	5.8
55	12.2	7.0
65	22.2	11.9
74	31	
83	(68)	

Fath's list includes all classes of nebulae, but the galactic nebulae are relatively so infrequent that it is practically one of non-galactic nebulae alone. These objects begin to appear at about 20° latitude and increase rapidly in the interval 20° to 35° . From 40° to 70° the numbers increase slowly. The concentration near the north galactic pole is very pronounced. Below latitude 70° the numbers in the southern hemisphere average about three-fourths those of the northern. The assumption of a similar ratio for the regions 70° to 90° leads to integrated totals of 170 000 and 128 000 for the northern and southern hemispheres, a round total of 300 000 for the whole sky (limiting phot. mag. for stars 18.6).

The summary in Table 2 emphasizes the dependence of the distribution on galactic latitude. The uncertainty in the average number per square degree in the region 70° – 90° is considerable, and since the number of nebulae in this region is large (29% or 50 000 in the northern hemisphere), the total given for the whole sky is in doubt by many thousand. Curtis (²) has estimated the total (to an undetermined limiting magnitude) to be over 700 000. The difference in the estimates may arise from a difference in magnitude limits or from the fact that the fields counted by Curtis are not certainly representative of the sky as a whole.

TABLE 2.—DISTRIBUTION OF NON-GALACTIC NEBULAE

Lat. = interval in galactic latitude. Sky = % area of sky. Neb. = % number of nebulae. N = northern, S = southern hemisphere.

Lat.	Sky	Neb.	
		N	S
0° – 30°	50	7	15
30° – 70°	44	64	56
70° – 90°	6	29	29

The distribution of non-galactic nebulae is not, however, simply one of galactic latitude. Data collected by Harcastle and Hinks (⁵) and by Reynolds (¹²) show marked irregularities in longitude, which seem to depend on the angular diameters of the nebulae. Thus objects with diameters $> 10'$ are almost all in the hemisphere including galactic longitudes 50° to 230° . For diameters $5'$ to $10'$ the northern galactic hemisphere shows high frequencies in longitude 110° and 260° – 270° , which become even more marked for diameters $2'$ to $5'$. For still smaller nebulae, the distribution is again different. Fath's counts, including mostly very small and faint nebulae, show a band of high frequency crossing the northern galactic hemisphere approximately in longitudes 50° and 220° , with other irregularities suggesting a very complicated distribution.

Nothing is known directly of the distances of elliptical nebulae, but their relationship with the spirals is so intimate that the distances of the two sub-classes must be regarded as of the same order. Van Maanen's measures (¹⁶) of internal motion in spirals suggest distances of the order of 3000 to 30 000 light years. The application of Shapley's period-luminosity relation by Hubble (⁹) to numerous typical Cepheid variables discovered by him in the spirals Messier 31 (the Andromeda nebula) and Messier 33 leads to distances of about a million light years for these two objects. The applicability of the period-luminosity relation is assumed, but several lines of corroborative evidence strongly support the larger value of the distance. It is probable, however, that the zero point of the period-luminosity relation requires revision by an amount which would reduce these distances by about 40%.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Barnard, *21*, 49: 1; 19 (also consult index of other volumes). (²) Curtis, *Publ. Lick Obs.* 13: 15; 18. (³) Curtis, *Ibid.*, 13: 60; 18. (⁴) Fath, *Astronom. Jour.* 28: 75; 14. (⁵) Harcastle and Hinks, *Monthly Notices, R. A. S.* 74: 699; 14. (⁶) Hinks, *Ibid.*, 71: 694; 11. (⁷) Hubble, *21*, 56: 162; 22. (⁸) Hubble, *21*, 56: 400; 22. (⁹) Hubble, *Pop. Astronomy* 33: 252; 25. *Observatory* 48: 139; 25. (¹⁰) Lundmark, *Publ. Astron. Soc. Pacific*, 34: 40; 22. (¹¹) Perrine, *21*, 46: 177; 17. (¹²) Reynolds, *Monthly Notices, R. A. S.* 81: 129; 20. 83: 147; 23. 84: 76; 23. (¹³) Seares, *21*, 62: 168; 25. (¹⁴) Shapley, *21*, 49: 311; 19. (¹⁵) van Maanen, *Mt. Wilson Contribs. Nos.* 237 (1922), 270 (1923), 280 (1925). (¹⁶) van Maanen, *21*, 57: 274; 23.

MOTIONS OF THE STARS AND NEBULAE

GUSTAF STRÖMBERG

The *proper motion* of a star is defined as the angular motion, per year, referred to a certain fundamental system of apparently bright stars distributed uniformly over the sky. The *radial motion* is determined by the Doppler shift for spectral lines of known wave-length. If the distance to a star is known, the three velocity-components of its *space-velocity* can be determined. Proper motions and radial velocities are in general referred to the sun as origin, by correction for the periodic changes due to the earth's motion. The proper motions are in general very small; for the majority of the stars they are below $0.1''$ per year. The largest proper motion is that of Barnard's star R. A. 17^h

53.0^m , Dec. $+4^\circ 28'$, (1900.0), which moves $10.27''$ per year. The radial velocities are mostly below 40 km/sec, the largest being that of the variable star V X Herculis, which approaches the sun with a velocity of 390 km/sec. The spiral nebulae have even higher velocities, the highest being 1800 km/sec, recession, (N. G. C. 584).

SOLAR MOTION

The sun's motion relative to the stars can be determined either from proper motions, from radial velocities, or from space-velocities. The point in the sky towards which the sun is moving is called the sun's *apex*.

TABLE 1.—SOLAR APEX AND THE SUN'S VELOCITY
(Referred to apparently bright stars. Unit: velocity, km/sec)

R. A. 1900	Dec. 1900	Velocity	Method	No. of stars	Lit.
18 ^h 03 ^m	+34.3°		Proper Motions P. G. C.*	5413	(2)
18 11	+31.6		Proper Motions $m < 6.0$ †	4041	(5)
17 56	+32.3		Proper Motions P. G. C.	5943	(8)
17 54	+25.3	19.5	Rad. Vel. Lick Obs.	1193	(3)
18 2	+28.6	19.8	Rad. Vel. B to M	1596	(6)
18 4	+29.2	21.5	Rad. Vel. F to M	1405	(9)
18 11	+36.9	18.8	Space Vel. Giants	800	(10)
18 43	+29.5	31.7	Space Vel. Dwarfs	415	(10)
18 40	+32	29	Space Vel. of nearby stars	83	(7)

* Preliminary General Catalogue by L. Boss, Washington, 1910.

† Stars brighter than the 6th magnitude (apparent).

Although the agreement between the different determinations is fairly good, a detailed study shows that the sun's motion can not be regarded as a constant vector. The A stars and giant stars in general give a small velocity for the sun; and dwarf stars, a much higher velocity.

AVERAGE PECULIAR MOTIONS OF THE STARS

After the effect of the sun's motion has been removed, the residual or "peculiar" velocities show certain regularities. The average peculiar velocities are different for stars of different spectral types, and vary also with the intrinsic brightness of the stars.

TABLE 2.—AVERAGE RESIDUAL RADIAL VELOCITIES (θ) OF STARS OF DIFFERENT SPECTRAL CLASSES (Sp) AND ABSOLUTE MAGNITUDES (M)

Unit of $\theta = 1$ km/sec

Sp	M*	θ	Lit.	Sp	M*	θ	Lit.
O5 to O9	-3	20.7	(11)	K	+1	18.4	(1)
B	-1	6.5	(3)	K	+6	27.0	(1)
A	+1	11.0	(11)	M	+1	21.6	(1)
F	+2	15.8	(1)	M	+9	29.6	(11)
G	+1	18.0	(1)	Me†	0	40.1	(11)
G	+5	26.3	(1)	P†	-	28.6	(11)

* The apparent magnitude as observed from a distance of 10 parsecs.

† Contains M stars with bright hydrogen-lines; all are variable stars of long period.

‡ Bright-line nebulae.

PREFERENTIAL MOTION

The peculiar velocities of the stars are not distributed at random. In general the stars show a tendency to move parallel to the galactic plane. To describe the distribution of the peculiar velocities, a distribution-function is adopted, which gives the relative numbers of stars moving in different directions and with different velocities. The simplest distribution-function is the spherical distribution-law,

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}} \sigma^3} e^{-\frac{x^2+y^2+z^2}{2\sigma^2}}$$

where x , y , and z are the velocity-components referred to the "centroid" of the group. N is the number of stars in the group, and σ is the dispersion or the square-root of the mean of the squares of the velocity-components. The number of stars of velocity-components between $x \pm \frac{1}{2}dx$, $y \pm \frac{1}{2}dy$, $z \pm \frac{1}{2}dz$ is then given by $F(xyz) dx dy dz$. In a spherical distribution, the frequency of a velocity is independent of its direction and only dependent upon its size. Spherical velocity-distributions occur for several classes of stars, but in general the distribution in

velocity-space is either flattened (B stars) or elongated (A, F, and dwarf stars). Two functions have been used to describe the elongated distribution. Kapteyn and Eddington have used a sum of two spherical functions and have regarded the stars as belonging to two intermingled systems, "two stream hypothesis." Schwarzschild has introduced the ellipsoidal distribution defined by the distribution-function

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}} abc} e^{-\left(\frac{x^2}{2a^2} + \frac{y^2}{2b^2} + \frac{z^2}{2c^2}\right)}$$

with three principal dispersions a , b , and c , which define the three axes of the "velocity-ellipsoid." The velocity-components x , y , and z are here projected on the principal axes of this ellipsoid. The major axis of the velocity-ellipsoid corresponds to the line joining the two centers in the two stream theory. The direction of this fundamental axis, which is common in the two theories, is about R. A. 6^h 6^m, Dec. +9°, (true vertex). The dwarf stars give a somewhat higher declination for the true vertex.

In the analysis of proper motions, the two stream theory gives two vertices, which correspond to the directions of motion of the two streams relative to the sun. The coordinates of these vertices are R. A. 6^h 14^m, Dec. -13° (first stream) and R. A. 19^h 16^m, Dec. -60° (second stream).

Analyzing stellar motions on the basis of the two stream theory, we find a number of stars which cannot be regarded as belonging to either of the two streams. The B stars and stars of spectral class M, for instance, have a group-motion intermediate between the two streams. For this reason Halm has introduced a third stream (0 stream). But these streams taken together can be fairly well represented by an ellipsoidal distribution using a smaller number of parameters.

Charlier (*) has introduced a generalization of the ellipsoidal theory which makes it possible to take into account deviations from a strictly ellipsoidal distribution, but it is only when these deviations are small that this generalization is practicable.

MOVING CLUSTERS OR GROUPS

Several stars move nearly parallel to one another, the best known example being 5 of the 7 bright stars in the constellation Ursa Major. Another moving group or cluster is the Hyades in the constellation Taurus (Taurus Group). The proper motions of the stars belonging to such a group converge towards a point in the sky, the "convergent point," whose position in the sky gives the direction of motion of the group relative to the sun. The convergent point for 17 stars belonging to the Ursa Major Group is R. A. 20^h 30^m, Dec. -40°; for the Taurus Group (39 stars) R. A. 6^h 7^m, Dec. +7°. A number of other moving groups are known.

THE GENERAL DISTRIBUTION OF COSMIC VELOCITIES

When the sun's motion is referred to different classes of objects it has been found that this motion is not a constant vector but varies greatly, from about 12 km/sec for the A stars and the Cepheids of long period up to 300 km/sec for the fast moving objects, the globular clusters and the spiral nebulae. A general relationship between group-motion and dispersion exists, which, according to Strömberg (11), holds for all classes of objects, but with a small deviation for the B star system. This variation in group-motion produces an asymmetry in the velocity distribution, in such a way that all fast moving objects move, relative to the sun, towards the same hemisphere. This asymmetry defines an axis along which the group-motion increases with increasing internal velocity-dispersion. The direction of this axis is R. A. 8^h 39^m, Dec. -57°, and the motion of objects with small velocity-dispersion relative to those of high velocity-dispersion is about 300 km/sec in the opposite direction. The group-motion of objects

with high velocity-dispersion is approximately the same as that of the globular clusters and spiral nebulae.

The general distribution of cosmic velocities can be approximately represented by a product of two symmetrical distributions S_1 and S_2 . The first of these is a sum of concentric and co-axial ellipsoidal distributions, the velocity of the sun relative to the center of the distribution S_1 being 14.8 km/sec in the direction R. A. $17^h 43^m$, Dec. $+22^\circ$. The sun's motion relative to the second distribution, S_2 , is 300 km/sec in the direction R. A. $20^h 28^m$, Dec. $+56^\circ$. The first distribution can be regarded as the velocity-distribution in our local system of stars, the second as a

velocity-restriction in a universal world-frame of enormous dimensions. Other interpretations, however, may be possible.

LITERATURE

(For a key to the periodicals see end of volume)

- (¹) Adams, *Strömberg and Joy*, #1, 54: 9; 21. (²) Boss, *326*, 26: 111; 10. (³) Campbell, *Lick Obs. Bull.* No. 196; 11. (⁴) Charlier, *Lund Observatorium, Meddelanden*, II: No. 13; 15. (⁵) Charlier and Wicksell, *Ibid.*, II: No. 12: 45; 15. (⁶) Gyllenberg, *Ibid.*, II: No. 13; 15. (⁷) Luyten, *Annals Harvard College Obs.* 65: No. 5; 23. (⁸) Raymond, *326*, 30: 191; 17. (⁹) Strömberg, #1, 47: 7; 18. (¹⁰) Strömberg, #1, 56: 265; 22. (¹¹) Strömberg, #1, 61: 363; 25.

TIME

CHRONOLOGICAL ERAS

Gregorian Calendar

Era	Year	Begins, 1925 A. D.
Byzantine†	7434	September 14
Diocletian†	1642	September 11
Grecian*†	2237	{ September 14 October 14
Hegira	1344†	July 21
Japanese	2585†	January 1
Jewish	5686†	September 18
Julian calendar	1925	January 14
Julian period	6638§	January 14
Mohammedan	1344†	July 21
Nabonassar†	2674	May 12
Rome†	2678||	January 14
Seleucidae†	2237	(See Grecian)

* In present-day usage of Syrians, begins in September or October depending upon the sect. In ancient usage of Damascus and Arabia Petraea, began with vernal equinox.

† The 14th year of period Taisho.

‡ Begins at sunset.

§ Julian day number of January 1, 1925 (Gregorian) is 2 424 152.

|| Since foundation of Rome, according to Varro.

¶ Based upon Julian calendar.

TIME

Interval	Days*
Year:	
Tropical†	365.2422
Sidereal	365.2564
Anomalistic	365.2596
Month:	
Synodical†	29.530 59
Tropical	27.321 58
Sidereal	27.321 66
Day:	
Sidereal	0.997 2696

* Mean solar days.

† Ordinary.

EQUATION OF TIME*

(Δ = mean - apparent)

Unit of Δ is minute. Time is Greenwich mean noon

Date	Δ	Date	Δ	Date	Δ
I 1	+ 3.4	V 11	-3.8	IX 18	- 5.6
6	5.8	16	-3.8	23	- 7.3
11	7.8	21	-3.7	28	- 9.0
16	9.7	26	-3.3	X 3	-10.7
21	11.3	31	-2.6	8	-12.2
26	12.6	VI 5	-1.8	13	-13.5
31	13.6	10	-1.0	18	-14.6
II 5	14.1	15	0.0	23	-15.5
10	14.4	20	+1.1	28	-16.1
15	14.3	25	2.2	XI 2	-16.3
20	14.0	30	3.2	7	-16.3
25	13.3	VII 5	4.2	12	-15.9
III 2	12.4	10	5.0	17	-15.1
7	11.4	15	5.6	22	-14.0
12	10.0	20	6.1	27	-12.5
17	8.7	25	6.3	XII 2	-10.7
22	7.2	30	6.3	7	- 8.8
27	5.7	VIII 4	6.0	12	- 6.5
IV 1	4.2	9	5.4	17	- 4.1
6	2.7	14	4.7	22	- 1.6
11	1.2	19	3.7	27	+ 0.9
16	+ 0.0	24	2.5	31	+ 2.8
21	- 1.2	29	+1.1		
26	- 2.2	IX 3	-0.4		
V 1	- 2.9	8	-2.1		
6	- 3.4	13	-3.8		

* Δ is the amount by which mean time exceeds apparent time when it is noon at Greenwich; it is the excess of the right ascension of the actual sun over that of the mean sun at that instant. It varies continuously with the time, and does not exactly repeat its values in successive years; those given are average values for Greenwich mean noon of an ordinary year, and will seldom differ from the actual values for that time by as much as 0.2 min., except in January and December, when the difference may amount to 0.3 min. In leap years, all dates in the table after February must be reduced by one day.

SOLAR SYSTEM

ORBITAL DATA; SOLAR SYSTEM (1925)

Units: Distance, 10^6 km; period, tropical year

Planet	Distance*	Eccentricity	Inclination†	Mean longitude		Sidereal period
				Node‡	Perihelion	
☿ Mercury.....	57.9	0.2056	7° 0' 12.0"	47° 26' 32.1"	76° 17' 18.9"	0.24085
♀ Venus.....	108.1	0.0068	3 23 38.0	76 0 16.7	130 30 56.8	0.61521
⊕ Earth.....	149.5	0.01674			101 39 2.3	1.00004
♂ Mars.....	227.8	0.0933	1 51 0.6	48 58 45.0	334 40 42.2	1.88089
♃ Jupiter.....	778	0.0484	1 18 26.4	99 41 26.3	13 6 51.4	11.862
♄ Saturn.....	1426	0.0558	2 29 28.7	113 0 5.7	91 34 42.0	29.458
♅ Uranus.....	2869	0.0471	0 46 22.1	73 36 57.7	169 26 56.8	84.015
♆ Neptune.....	4496	0.00855	1 46 36.7	130 57 13.3	43 58 27.9	164.788

* Mean distance.

† Angle between plane of orbit and plane of ecliptic.

‡ Ascending node.

CHARACTERISTICS OF MEMBERS OF SOLAR SYSTEM

Units: Linear diameter, 1000 km; density, g/cm³; time, mean solar

Name	Diameter		Mass† × 10 ⁶ Mass sun	Density	Sidereal rotation	Number satellites
	Linear	Angular*				
Mercury.....	4.84	10.90"	0.1670	5.6		0
Venus.....	12.19	1' 0.80	2.451	5.1		0
Earth.....	12.76§		3.036‡	5.52	23 hr 56.07 min	1
Mars.....	6.78	17.88	0.3233	3.9	24 37.4	0
Jupiter.....	142.7§	46.86§	954.8	1.4	9.8 hr	7
Saturn.....	120.8§	19.52§	285.6	0.7	10.2 hr	9
Uranus.....	49.7	3.76	43.7	1.3+		4
Neptune.....	53.0	2.52	50.8	1.3		1
Sun||.....	1391	31 59.26	1 001 341	1.4	25.3 da	
Moon.....	3.48	31 5.16¶	0.037**	3.3	27.32 da	

* At distance = difference mean distance sun to object and mean distance sun to Earth; nearly at distance of nearest approach to Earth.

† Includes satellite (or planetary) system, if any.

‡ Mass of Earth alone = 2.999×10^{-6} mass of sun.

§ Equatorial diameter. Polar diameter: Earth = 12.71; Jupiter = 133.2, 43.74"; Saturn = 108.1, 17.46". Diameter of sphere of volume = Earth, is 12.74.

|| At mean distance of Earth, gravitational acceleration due to Sun is $k^2 = 2.9592 \times 10^{-8}$ (mean distance) per day² = 0.5926 cm per sec². For solar spectrum etc., see index.

¶ At mean distance from Earth. Apparent diameter varies, with distance, from 29.5' to 33.5'.

** Moon alone. Mass Moon = 0.01227 mass Earth.

SOLAR DATA

Inclination of equator to ecliptic, about.... 7°
Longitude of ascending node of equator.... 74.5°
Period of rotation, about..... 28 da*
Sun spot period, about..... 11 yr

TERRESTRIAL AND LUNAR DATA†

General precession (retro-
grade)..... $50.2564'' + 0.000222''(t - 1900)$ per yr
Obliquity of the ecliptic..... $23^\circ 27' 8.26'' - 0.4684''(t - 1900)$

* From observations of sun spots near latitude 45°; spots near equator rotate in about 24 da; those near lat. 80°, in 30 da.

† For geodetic and geophysical data, see p. 393.

Constant of notation..... 9.21'' }
Constant of aberration..... 20.47'' } Paris conference values
Solar parallax..... 8.80'' }
From parallax measurements..... 8.806''
From velocity of light..... 8.781
From mass of Earth..... 8.762
From motion of Moon..... 8.773
Equatorial horizontal parallax of Moon*..... 57' 2.70'' (Brown)
Mean distance Earth to Moon..... 384 403 km
Inclination of Moon's equator to ecliptic..... 1° 32.1''
Inclination of Moon's orbit to ecliptic, about 5°
Eccentricity of Moon's orbit (average)..... 0.055
Revolution of Moon's nodes (retrograde)..... 18.6 yr

* Mean of greatest and least values; actual values vary from 53' to 61' ca.

COMPOSITION OF THE ATMOSPHERE

W. J. HUMPHREYS

TABLE 1.—COMPOSITION OF DRY AIR AT SEA-LEVEL (4, 5)

v = volume of the gas in volume V of dry air

Gas	N ₂	O ₂	A	CO ₂	H ₂ *	Ne	He	Kr	Xe
10 v /V	7803	2099	94	3	1	0.123	0.04	0.005	0.0006

* Values found by analysis vary; the one here given is that accepted by Hann and the *Recueil de Constantes Physiques*.

TABLE 2.—COMPOSITION OF ATMOSPHERE AT VARIOUS LEVELS

Computed from data of Table 1 on the assumptions: (1) at surface, H₂O vapor supplies 1.2% of the total number of gas molecules, (2) absolute humidity decreases rapidly to a negligible amount at about 10 km, (3) temperature = 11°C at sea-level, decreases normally (6°C per km) to -55°C at 11 km, remains constant above 11 km, (4) relative proportions of the gases, water vapor excepted, remains constant up to 11 km, (5) above 11 km, distribution is in accordance with their molecular weights (3). The amount of H₂ is in doubt (see note Table 1), especially above 11 km; it may become oxidized to H₂O before reaching the upper atmosphere.

v = volume of the gas contained in volume V of atmosphere. Unit of height = 1 km = 0.621 mi.; of pressure = 1 mm of Hg

Height	100 v /V							Total pressure
	N ₂	O ₂	H ₂ O	A	CO ₂	H ₂	He	
140	0.01					99.15	0.84	0.0040
130	0.04					99.00	0.96	0.0046
120	0.19					98.74	1.07	0.0052
110	0.67	0.02	0.02			98.10	1.19	0.0059
100	2.95	0.11	0.05			95.58	1.31	0.0067
90	9.78	0.49	0.10			88.28	1.35	0.0081

Height	100 v /V							Total pressure
	N ₂	O ₂	H ₂ O	A	CO ₂	H ₂	He	
80	32.18	1.85	0.17			64.70	1.10	0.0123
70	61.83	4.72	0.20	0.03		32.61	0.61	0.0274
60	81.22	7.69	0.15	0.03		10.68	0.23	0.0935
50	86.78	10.17	0.10	0.12		2.76	0.07	0.403
40	86.42	12.61	0.06	0.22		0.67	0.02	1.84
30	84.26	15.18	0.03	0.35	0.01	0.16	0.01	8.63
20	81.24	18.10	0.02	0.59	0.01	0.04		40.99
15	79.52	19.66	0.01	0.77	0.02	0.02		89.66
11	78.02	20.99	0.01	0.94	0.03	0.01		168.00
5	77.89	20.95	0.18	0.94	0.03	0.01		405.
0	77.08	20.75	1.20	0.93	0.03	0.01		760.

TABLE 3.—MASSES OF THE ATMOSPHERE AND ITS CONSTITUENTS

Based upon Table 1, the assumptions of Table 2, and the assumption that the average atmospheric pressure at the surface of the earth = 73.7 cm and at base of stratosphere = 14.5 cm (1, 2). Area of earth is taken as 51×10^{17} cm².

Total mass $M = m \times 10^6$ kg; 1000 kg = 1.102 tons (of 2000 lb.)

Gas	All	N ₂	O ₂	A	H ₂ O	CO ₂	H ₂	Ne	Kr	He	Xe
m	511	387	116	624	133	217	129	471	64	63	116
n	16	16	16	14	14	13	12	11	11	11	10

LITERATURE

(For a key to the periodicals see end of volume)

(1) Hann, *Lehrbuch der Meteorologie* (3rd ed.). (2) Humphreys, *Monthly Weather Review*, 49: 341; 21. (3) Humphreys, *Physics of the Air*, p. 69; 20. (4) Ramsay, *ibid.*, 80: 599; 08. (5) Various authorities.

MISCELLANEOUS GEODETIC DATA

W. D. LAMBERT

With certain exceptions which are especially noted, those of the following data which depend upon the dimensions of the earth have been calculated strictly in accordance with the INTERNATIONAL ELLIPSOID OF REFERENCE, adopted by the Section of Geodesy of the International Geodetic and Geophysical Union, meeting at Madrid, October 6 and 7, 1924. This ellipsoid is based upon the results obtained by J. F. Hayford (Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy, Washington, 1910), but is not absolutely identical with Hayford's ellipsoid. (For some of the other spheroids that are used for geographical purposes, see Special Publication #100, U. S. Coast and Geodetic Survey. Recent attempts have been made to show that the actual figure of the earth can be represented more closely by an ellipsoid of three unequal axes, than by one of revolution, systematic departures from the latter being of the order of 100 to 200 meters in elevation and depression.)

If the positions of the two ends of a line are determined geodetically for any assumed spheroid of reference, the uncertainty in the length of the line as measured along the earth depends almost entirely upon the errors in the survey; for geodetic surveys of the highest class, the uncertainty is a little less than one in 100 000 and for an ordinary fair survey it is about four times as great. The proportional error in the straight-line distance is greater, mainly because the geoid does not coincide with the ellipsoid; these additional errors are not serious for a short line, but for two points almost diametrically opposite may amount to 100 or 200 meters.

If the end points are determined astronomically, the principal error in the computed length is due to the difference in the deflection of the plumb-line at the two points; unless the measured line is short, the average uncertainty so introduced is of the order of 200 meters, but may be much more, especially in rugged country.

Latitude.—The latitude of a place is defined as the angle which some line of reference makes with the equatorial plane. Four lines of reference, defining four distinct kinds of latitude, are used. Three of these lines pass through the place considered; *viz.*, (1) The plumb-line, defining the *astronomical* latitude, (2) the normal to the spheroid of reference, defining the *geographical* latitude, and (3) the line to the center of the earth, defining the *geocentric* latitude. The fourth line of reference passes through the center of the earth and that point which is upon the circumscribed sphere (radius = equatorial radius of the spheroid) and at the same distance from the axis of rotation as is the point on the spheroid representing the place considered; this defines the *parametric*, or *reduced*, latitude.

Gravity.—If the earth's sea-level surface were accurately represented by the International Ellipsoid of Reference, and if no attracting matter projected above this surface, then the variation of gravity at sea-level (γ_0) would be represented by the equations

$$\begin{aligned}\gamma_0 &= \gamma_e(1 + 0.005\,288 \sin^2\varphi - 0.000\,006 \sin^2 2\varphi) \\ &= \gamma_{45}(1 - 0.002\,637 \cos 2\varphi + 0.000\,006 \cos^2 2\varphi)\end{aligned}$$

¹ The resultant acceleration arising from the gravitational attraction and the rotation of the earth.

where φ is the geographic latitude, and γ_e, γ_{45} are the values of γ at the equator and at latitude 45° , respectively. These equations differ slightly from that used in computing the table on p. 396; the latter corresponds to an ellipticity of $1/297.4$.

TABLE 1.—FORM AND SIZE OF THE EARTH

Based upon International Ellipsoid of Reference; accepted constants, from which the others are computed, are $a = 6\,378\,388$ meters, ellipticity $[(a - b)/a] = 1/297$. The indicated uncertainties are estimates, by Lambert, based upon a consideration of systematic errors as well as of internal discordances.

a = semi-major axis.....	=	6 378 388 (± 60) m
b = semi-minor axis.....	=	6 356 911.946 m
Radius of sphere of same area.....	=	6 371 227.7 m
Radius of sphere of same volume.....	=	6 371 221.3 m
Length of equatorial quadrant.....	=	10 019 148.4 m
Length of meridional quadrant.....	=	10 002 288.3 m
f = ellipticity = $\left(\frac{a-b}{a}\right)$	=	0.003 367 0034
$\frac{1}{f}$ = reciprocal of ellipticity.....	=	297.0 (± 0.4)
e^2 = (eccentricity) 2 = $f^2 \left(\frac{2}{f} - 1\right) = \frac{a^2 - b^2}{a^2}$	=	0.006 722 6700
Area of the ellipsoid.....	=	510 100 934 km 2
Land area.....	=	148 847 000 km 2
Ocean area.....	=	361 254 000 km 2
Volume of the ellipsoid.....	=	1 083 319.78 $\times 10^6$ km 3
Mass of the ellipsoid* ($d = 5.527$ g/cm 3 , p. 395).....	=	5.988 $\times 10^{24}$ kg
Principal moments of inertia ($A = B < C$)†:		
$A\ddagger = B\ddagger$	=	0.332 35 Ea^2
$C\ddagger$	=	0.333 44 Ea^2
$C - A$	=	0.001 0921 Ea^2
$\left(\frac{C-A}{C}\right) = \left(\frac{1}{305.12}\right)\ddagger$	=	0.003 2774

* For discussion of variation of density with depth below surface, see Adams and Williamson, Smithsonian Annual Report, 1923, p. 241.

† E = mass of earth.

‡ Computed values vary but little with any admissible assumption regarding the constitution of the interior of the earth. Values are based upon computations of De Sitter (64V, 27: 233; 24); ellipticity taken as $1/296.92$.

§ Deduced from precession of equinoxes; involves no hypothesis regarding constitution of interior of earth.

TABLE 2.—DISTANCES UPON SURFACE OF THE INTERNATIONAL ELLIPSOID OF REFERENCE

M = length of meridian from equator to geographic latitude φ ; S_m = length of meridian from latitude $(\varphi - \frac{1}{2}\Delta\varphi)$ to $(\varphi + \frac{1}{2}\Delta\varphi)$; S_p = length of arc of parallel for 1° of longitude at latitude φ . These may be computed by means of the equations: $M = a\varphi - b \sin 2\varphi + c \sin 4\varphi - d \sin 6\varphi$; $S_m = a\Delta\varphi - b \sin \Delta\varphi \cos 2\varphi + c \sin 2\Delta\varphi \cos 4\varphi - d \sin 3\Delta\varphi \cos 6\varphi$; S_m (for $\Delta\varphi = 1^\circ$) = $a - b \cos 2\varphi + c \cos 4\varphi - d \cos 6\varphi$; $S_p = a \cos \varphi - b \cos 3\varphi + c \cos 5\varphi$; where the coefficients and their logarithms have the following values:

Unit of length = 1 meter; of angle = 1°

	M^*		S_m^*	
	Value	log $_{10}$	Value	log $_{10}$
a	111 136.537	5.045 856 86	111 136.537	5.045 856 86
b	16 107.035	4.207 015 6	32 214.069	4.508 045 6
c	16.976	1.229 84	33.952	1.530 87
d	0.022	2.348	0.045	2.649

	S_m^* for $\Delta\varphi = 1^\circ$		S_p^*	
	Value	log $_{10}$	Value	log $_{10}$
a	111 136.537	5.045 856 86	111 417.657	5.046 954 02
b	562.213	2.749 901	93.904	1.972 686
c	1.185	0.073 7	0.119	1.074 6
d	0.002	3.37		

* Owing to uncertainty regarding the actual size of the earth, actual distances upon the earth at sea-level may differ from these computed distances by about 2 in 100 000 near the equator or the poles, by somewhat less in middle latitudes.

TABLE 3.—EXCESS OF GEOGRAPHIC LATITUDE (φ) OVER GEOCENTRIC (φ') AND PARAMETRIC (θ) LATITUDES

$$\begin{aligned}\varphi - \varphi' &= a \sin 2\varphi - b \sin 4\varphi + c \sin 6\varphi \\ &= a \sin 2\varphi' + b \sin 4\varphi' + c \sin 6\varphi' \\ \varphi - \theta &= a' \sin 2\varphi - b' \sin 4\varphi + c' \sin 6\varphi \\ &= a' \sin 2\theta + b' \sin 4\theta + c' \sin 6\theta\end{aligned}$$

where the coefficients and their logarithms have the following values:

Unit of coefficients = $1''$

	Value			Value	
	Value	log $_{10}$		Value	log $_{10}$
a	695.6635	2.842 3992	a'	347.8327	2.541 3704
b	1.1731	0.069 34	b'	0.2933	1.467 29
c	0.0026	3.421	c'	0.0003	4.52

TABLE 4.—MISCELLANEOUS TERRESTRIAL DATA

Angular velocity of rotation.....	72.921 $\times 10^{-6}$ radians/sec*
Rotational energy.....	2.160 $\times 10^{26}$ ergs
Rotational energy lost by tidal friction.....	1.1 $\times 10^{19}$ ergs/sec†
Work required to dissipate the material of the earth to infinity..	2.46 $\times 10^{29}$ ergs
Mean elevation of land above sea-level.....	825 m
Mean depth of the oceans.....	3681 m
Mean effective viscosity is not known, but perhaps between.....	10^{20} and 10^{24} poises‡

* Mean solar second.

† Jeffreys, 62, 221A: 239; 20; The Earth, Its Origin, History and Physical Constitution, 205-237; 24. Heiskanen, 175, 18A: 1; 21.

‡ Schweydar, Veröffentl. des Preuss. Geodät. Inst., No. 79; 19; Jeffreys, Monthly Notices, Roy. Ast. Soc., 76: 648; 15. 76: 84; 16. 77: 449; 17; also The Earth, its Origin, History, and Physical Constitution, 222; 1924.

Rigidity (μ). From the yielding of the solid portions (revealed by observations with horizontal pendulums), and on assumption of incompressibility, Schweydar (Zentralbureau Int. Erdmes., Neue Folge No. 38, 1921) deduces $\mu = 30.8 (1 - 0.90r^2/a^2) \times 10^{11}$ dynes/cm 2 , and mean effective rigidity = 17.6×10^{11} dynes/cm 2 (r = distance from center, a = mean radius). To allow for compressibility, these values must be increased by about 20% (Lambert, preliminary, unpublished computations); even then the value computed for the outer shell of half-radius thickness is much less than that deduced from earthquake data. (See Adams and Williamson, Smithsonian Annual Report, 1923.) The discrepancy may arise from Schweydar's assumption of high rigidity in the central portions, which may possibly behave as a fluid. (See Knott, 68, 39: 157; 19; Sieberg, Geologische, physikalische und angewandte Erdbebenkunde, 364; 23.)

GRAVITY DATA

CLARENCE H. SWICK

This section includes: (A) The value of the gravitation constant; (B) the absolute determination upon which the tabulated values of the acceleration of gravity¹ rest; (C) values of the acceleration of gravity (g) at numerous stations well distributed over the surface of the earth, together with a table giving the values of g at sea-level and at various latitudes; and (D) means for computing the variation in g with the distance of the station above, or below, either the surface of the earth or sea-level. In preparing the data, valuable assistance was received from several colleagues. In particular should be mentioned Mr. W. D. Lambert's assistance with section D, and Miss Sarah Beall's and Mr. H. S. Rappleye's assistance with section C.

A. GRAVITATION CONSTANT

The best determinations of the gravitation constant (G)² are considered to be those by C. V. Boys (7) and by K. Braun (8). Each used an improved form of the Cavendish apparatus; and they obtained almost identical results, the final values of the two determinations being the same to the fourth significant figure. They found

$$G = 6.658 \times 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ sec}^{-2}$$

which requires that the mean density of earth = 5.527 g/cm³.

B. BASIS OF REFERENCE

The observed values of gravity in Tables 1 and 2 are relative determinations in the Potsdam system, that is, they are based on

¹ Throughout this section the term *acceleration of gravity*, or, briefly, *gravity*, is used, in its commonly accepted sense, to denote the resultant acceleration arising from the gravitational attraction and the rotation of the earth. It is this resultant which is denoted by g .

² The force (f) of gravitational attraction between two masses (m , m_1) separated by the distance r is $f = G \frac{mm_1}{r^2}$.

the value of 981.274 cm/sec² for the pendulum room of the Geodetic Institut in Potsdam, Germany. This value for Potsdam is the result of a large number of careful absolute determinations extending over a series of years. The degree of uncertainty in such absolute determinations is well illustrated by the fact that a similar series of absolute determinations at Vienna, Austria, gave a value 0.016 cm/sec² greater than the one above when referred to Potsdam by relative determinations.

All determinations of gravity should be based on the Potsdam system by means of relative determinations with some station already accurately based on that system. A table of 20 base stations on the Potsdam system is given in *Comptes Rendus l'Association Geodesique Internationale* for 1909, III:25. Most of these stations are included in Table 1.

C. ACCELERATION OF GRAVITY AT SELECTED STATIONS

The stations included in Table 1 are grouped (1) in the order America, Europe, Asia, Africa, Australia, and Oceanic; (2) generally, alphabetically according to countries (United States of America, first); (3) in each subdivision, the stations are arranged alphabetically. Numerals in parentheses, following the name of a subdivision or station refer to the bibliography, and indicate the source from which the data were obtained. If the effect of topography and of isostatic compensation has been computed on the uniform basis of compensation extending to a depth of 113.7 km, the amount of this computed effect is given in the column TC. This effect is the amount by which the actual value of the acceleration would exceed that obtained from Table 2, after correction for elevation by means of equation (1), if there were complete isostatic compensation and if the local distribution of matter were not anomalous.

TABLE 1.—ACCELERATION (g) OF GRAVITY, POTSDAM SYSTEM
(The effect of topography and of isostatic compensation = TC)
Units: Elevation (h), meters; g , cm/sec²; TC, cm/sec²

Station	Latitude	Longitude	h	<i>g</i>	TC	Station	Latitude	Longitude	h	<i>g</i>	TC
AMERICA						Madison, Wis. (University of Wisconsin).	43° 4.6'	89° 24.0'	270	980.365	+0.003
United States (*, †)						Minneapolis, Minn. (University of Minnesota).....	44 58.7	93 13.9	256	980.597	-0.005
Albany, N. Y. (Public School No. 24).....	42° 39.1'	73° 46.1'	61	980.344	-0.006	Mount Hamilton, Calif. (Lick Observatory).....	37 20.4	121 38.6	1282	979.660	+0.120
Apalachicola, Fla. (Weather Bureau).....	29 43.5	84 58.8	4	979.322	+0.015	New Orleans, La. (City Hall).....	29 57.0	90 4.2	2	979.324	+0.013
Asheville, N. C. (Post-office).....	35 35.9	82 33.3	670	979.603	+0.026	New York, N. Y. (Columbia University).....	40 48.5	73 57.7	38	980.267	+0.011
Atlanta, Ga. (State Capitol).....	33 45.0	84 23.3	324	979.524	+0.014	Norris Geyser Basin, Wyo. (Yellowstone Park).....	44 44.2	110 42.0	2276	979.950	+0.031
Austin, Tex. (University).....	30 17.2	97 44.2	189	979.283	-0.001	Pembina, N. Dak. (Public School).....	48 58.1	97 14.9	243	980.917	-0.009
Baltimore, Md. (Johns Hopkins University).....	39 17.8	76 37.3	30	980.097	+0.006	Philadelphia, Pa. (University of Pennsylvania).....	39 57.1	75 11.7	16	980.196	+0.009
Bismarck, N. Dak. (Will School).....	46 48.5	100 47.0	516	980.625	-0.005	Pierre, S. Dak. (High School).....	44 21.9	100 20.8	454	980.427	-0.013
Boise, Idaho (High School).....	43 37.2	116 12.3	821	980.212	-0.042	Pittsburgh, Pa. (Second Ward School).....	40 27.4	80 0.6	235	980.118	0.000
Calais, Me. (High School).....	45 11.2	67 16.9	38	980.631	+0.010	Point Isabel, Tex.....	26 4.7	97 12.4	8	979.076	+0.015
Cambridge, Mass. (Harvard College Observatory).....	42 22.8	71 7.8	14	980.398	+0.010	Portland, Oreg. (Custom House).....	45 31.4	122 40.7	8	980.646	-0.016
Charleston, W. Va. (High School).....	38 20.9	81 37.7	184	979.936	-0.010	Potsdam, N. Y. (Clarkson School of Technology).....	44 40.1	74 58.8	130	980.571	-0.004
Charleston, S. C. (S. C. Military Academy).....	32 47.2	79 56.0	6	979.546	+0.016	Princeton, N. J. (Princeton University).....	40 21.0	74 39.5	64	980.178	+0.013
Charlottesville, Va. (University of Virginia).....	38 2.0	78 30.3	166	979.938	+0.002	Richmond, Va. (Post-office).....	37 32.2	77 26.1	30	979.960	+0.010
Chicago, Ill. (Univ. of Chicago).....	41 47.4	87 36.1	182	980.278	+0.007	St. Louis, Mo. (Washington University).....	38 38.0	90 12.2	154	980.001	+0.001
Cincinnati, Ohio (Cincinnati Observatory).....	39 8.3	84 25.3	245	980.004	+0.002	Salt Lake City, Utah (Temple Block).....	40 46.1	111 53.8	1322	979.803	-0.041
Cleveland, Ohio (Adelbert College).....	41 30.4	81 36.6	210	980.241	0.000	San Francisco, Calif. (Davidson Observatory).....	37 47.5	122 25.7	114	979.965	+0.045
Colorado Springs, Colo. (Colorado College).....	38 50.7	104 49.0	1841	979.490	-0.007	Sandpoint, Idaho (Farmington Central School).....	48 16.4	116 33.3	637	980.680	-0.044
Denver, Colo. (University of Denver).....	39 40.6	104 56.9	1638	979.609	-0.015	Seattle, Wash. (Washington State University).....	47 39.6	122 18.3	58	980.733	-0.020
Dover, Del. (Wilmington Conference Academy).....	39 9.7	75 32.0	12	980.099	+0.013	Springfield, Ill. (Edwards Public School).....	39 47.7	89 39.5	183	980.089	+0.005
El Paso, Tex. (High School).....	31 46.3	106 29.0	1146	979.124	+0.001	State College, Pa. (Chemistry Physics Building).....	40 47.9	77 51.8	358	980.124	+0.010
Galveston, Tex. (Ball High School).....	29 18.2	94 47.5	3	979.272	+0.007	Terre Haute, Ind. (Rose Polytechnic Institute).....	39 28.7	87 23.8	151	980.072	+0.001
Georgetown, Tex. (Southwestern University).....	30 38.0	97 40.1	231	979.298	+0.002	Washington, D. C. (U. S. C. and G. S., base station).....	38 53.2	77 0.5	14	980.112	+0.004
Goldfield, Nev. (High School).....	37 42.2	117 14.5	1716	979.456	+0.027	Washington, D. C. (Bureau of Standards).....	38 56.3	77 4.0	103	980.095	+0.012
Hartford, Conn. (Jarvis Laboratory of Trinity College).....	41 44.8	72 41.8	37	980.336	+0.008	Wilmington, N. C. (Court House).....	34 14.2	77 56.6	9	979.663	+0.023
Hinsdale, Mont. (Public School).....	48 23.8	107 5.3	661	980.739	-0.017	Worcester, Mass. (Worcester Polytechnic Institute).....	42 16.5	71 48.5	170	980.324	+0.018
Hoboken, N. J. (Stevens Institute of Technology).....	40 44	74 2	11	980.269	+0.008	Yavapai, Ariz. (Yavapai Point).....	36 3.9	112 7.1	2179	979.192	+0.034
Indianapolis, Ind. (Postoffice).....	39 45.9	86 8.8	217	980.090	+0.003	Alaska (*)					
Ithaca, N. Y. (Cornell University).....	42 27.1	76 29.0	247	980.300	+0.005	Fort Egbert, Eagle City.....	64 47.4	141 12.4	269	982.183	-0.042
Kansas City, Mo. (Franklin School).....	39 5.8	94 35.4	278	979.990	-0.001	Percy Islands, Southeast Alaska.....	54 55.8	131 35.3	4	981.524	-0.013
Key West, Fla. (Post-office).....	24 33.6	81 48.4	1	978.970	+0.035						
Lancaster, N. H. (High School).....	44 29.5	71 34.3	261	980.486	+0.007						
Las Vegas, N. Mex. (Normal School).....	35 35.8	105 12.1	1960	979.204	+0.017						
Little Rock, Ark. (Postoffice).....	34 45.0	92 16.4	89	979.721	+0.001						

Station	Latitude	Longitude	h	g	TC	Station	Latitude	Longitude	h	g	TC
Point Young, South-east Alaska.....	58° 11.5'	134° 33.4'	7	981.757	-0.054	Karlowitz.....	49° 21.9'	18° 18.7'E.	510	980.890	
Quiet Harbor, South-east Alaska.....	56 14.1	132 39.6	4	981.624	-0.034	Mount Hora.....	49 10.3	15 42.4 E.	710	980.845	
St. Michael.....	63 28.5	162 2.4	1	982.192	-0.004	Rosenau.....	48 39.1	20 32 E.	281	980.871	
St. Paul Island.....	57 7.3	170 16.6	10	981.726	+0.041	Denmark (2)					
Canada (6, 20, 21, 22)						Copenhagen (Sternwarte, base station)	55 41.2	12 34.7 E.	14	981.559	
Arctic Red River, N. W. Ter.....	67 26.6	133 44.2	41	982.434	-0.026	Frederikshavn.....	57 27.1	10 32.2 E.	15	981.740	
Banff, Alta.....	51 10.9	115 34.5	1376	980.753	-0.012	Magleby.....	54 47.3	10 43.0 E.	14	981.502	
Calgary, Alta.....	51 2.7	114 3.8	1044	980.823	-0.022	Peders Kirke.....	55 1.6	14 58.8 E.	42	981.533	
Charlottetown, P. E. I.	46 13.9	63 7.5	8	980.733	+0.013	Trige.....	56 15.2	10 9.5 E.	91	981.618	
Chipewyan, Alta.....	58 42.7	111 8.8	229	981.723	-0.012	Vinding.....	55 40.3	9 34.5 E.	78	981.575	
Good Hope, N. W. Ter.....	66 15.3	128 38.2	59	982.340	-0.029	Deutschland, see Germany.					
Halifax, N. S.....	44 40.8	63 33.8	9	980.574	+0.008	England, see Great Britain.					
Kenora, Ont.....	49 46.0	94 30.0	330	980.974	+0.018	España, see Spain.					
Kingston, Ont. (City Hall).....	44 14.6	76 28.8	79	980.530	+0.008	Finland (2)					
Liard River, B. C.....	59 58.7	123 47.5	160	981.790	-0.059	Helsingfors (Observatory).....	60 9.7	24 57.3 E.	29	981.912	
Moose Jaw, Sask.....	50 23.4	105 31.8	541	980.943	+0.003	Uleaborg.....	65 1.2	25 29.1 E.	9	982.262	
Norman, N. W. Ter.....	64 54.0	125 34.2	87	982.214	-0.036	Viborg (Viipurin).....	60 42.9	28 43.7 E.	12	981.928	
Ottawa, Ont. (Dominion Observatory, base station).....	45 23.6	75 43.0	83	980.618	0.000	Fiume (2)	45 20.0	14 25.8 E.	10	980.630	
Peace River, Alta.....	56 14.1	117 17.2	324	981.482	-0.038	France (2, 3)					
Port Arthur, Ont. (Masonic Building).....	48 26.0	89 13.0	189	980.820	-0.014	Arachon.....	44 39.6	1 10.4	24	980.586	
Providence, N. W. Ter.....	61 21.2	117 39.2	156	981.955	-0.018	Aurillac, Lyceum.....	44 56.8	2 26.6 E.	640	980.483	
Resolution, N. W. Ter.....	61 10.1	113 40.5	152	981.942	-0.009	Bayonne.....	43 29.7	1 28.0	3	980.475	
Revelstoke, B. C.....	50 59.8	118 11.8	453	980.903	-0.080	Bordeaux (Observatoire).....	44 50.1	0 31.4	72	980.572	
St. Jérôme (Chateau Larose).....	45 46.6	74 0.0	107	980.681	+0.006	Coutras.....	45 2.5	0 7.9	13	980.591	
St. John, N. B. (Meteorological Observatory).....	45 16.0	66 5.0	33	980.663	+0.016	Jonzac.....	45 26.7	0 26.0	35	980.647	
Sault Ste. Marie, Ont. (City Hall).....	46 30.4	84 19.2	186	980.680	-0.005	Langon.....	44 32.7	0 15.3	25	980.561	
Simpson, N. W. Ter.....	61 51.6	121 20.8	132	982.004	-0.023	Lihons.....	49 50.0	2 45 E.	106	981.038	
Sydney, N. S.....	46 8.4	60 11.8	12	980.731	+0.014	Lyon.....	45 41.0	4 47 E.	286	980.629	
Vancouver, B. C.....	49 16.8	123 6.8	6	980.949	-0.046	Marseille (Observatoire).....	43 17.9	5 23 E.	61	980.482	
Winnipeg, Man.....	49 54.4	97 8.0	231	980.990	+0.002	Metz.....	49 7.0	6 10.7 E.	175	980.957	
Woodstock, N. B. (Armoury).....	46 9.0	67 34.5	56	980.699	+0.008	Meudon (Observatoire).....	48 48.3	2 13.9 E.	130(?)	980.919	
Woodstock, Ont. (Market).....	43 8.6	80 47.0	299	980.352	-0.002	Mont Blanc (Observatoire).....	45 50	6 52 E.	4807	979.401	
Central and South America (2)						Mont-Louis.....	42 31.0	2 7 E.	1620	979.996	
Bahía Blanca, Argentina.....	38 47.1 S.	62 15.9	2	980.061		Nice (Observatoire).....	43 42.8	7 18 E.	367	980.471	
Buenos Aires, Argentina.....	34 36.5 S.	58 22.2	2	979.669		Paris (Observatoire, base station).....	48 50.2	2 20.3 E.	61	980.943	
Bahia, Brazil.....	12 58.5 S.	38 31.0	4	978.331		Port-Vendres.....	42 50.9	3 6 E.	25	980.456	
Panama, Canal Zone.....	8 54.9	79 31.9	6	978.243		Rosendaël-les-Dunk.....	51 2.9	2 24 E.	20	981.170	
Valdivia, Chile.....	39 53.4 S.	73 28.3	10	979.920		Soulac.....	45 31.0	1 7.4	8	980.655	
Valparaiso, Chile.....	33 1.8 S.	71 38.5	60	979.609		Strasbourg (base station).....	48 35.0	7 46.1 E.	137	980.904	
Callao, Peru.....	12 4.1 S.	77 15.8	1	978.375		Valence.....	44 56	4 53 E.	125	980.562	
Acajutla, Salvador.....	13 34.7	89 50.4	12	978.303		Germany (2, 6)					
Montevideo, Uruguay.....	34 54.5 S.	56 12.9	4	979.772		Alter Bruch.....	50 45.7	15 44.6 E.	917	980.930	+0.060
Canada see Canada.						Bremen.....	53 5.0	8 49.2 E.	0	981.341	
EUROPE						Brocken.....	51 48.0	10 37 E.	1140	981.015	+0.088
Allemagne, see Germany.						Coburg.....	50 16.0	10 58 E.	290	981.015	
Angleterre, see Great Britain.						Göttingen (Sternwarte).....	51 32.0	9 57 E.	162	981.176	
Austria (2, 6)						Grimmen.....	54 6.9	13 2.7 E.	11	981.434	
Brenner.....	47 0.3	11 30.5 E.	1372	980.353		Hamburg (Seewarte).....	53 32.8	9 58.3 E.	24	981.375	
Dalaas.....	47 8	9 59 E.	838	980.454		Helgoland.....	54 10.8	7 53.1 E.	51	981.410	
Grafenstein.....	46 37	14 28 E.	417	980.614		Immenstaad.....	47 40.0	9 22.1 E.	403	980.709	
Mixnitz.....	47 19.8	15 22 E.	445	980.657		Jena.....	50 55.6	11 35.2 E.	154	981.123	
Ober-Drauburg.....	46 45	12 58 E.	617	980.555		Karlsruhe.....	49 0.7	8 24.7 E.	114	980.967	
Stilfserjoch (Stelvio Pass).....	46 31.8	10 27.4 E.	2760	980.045	0.152	Kiel (Sternwarte).....	54 20.5	10 9 E.	41	981.464	
Vienna (base station).....	48 12.7	16 21.5 E.	183	980.860		Kirchhain.....	51 38.3	13 33.5 E.	98	981.235	
Waidhofen.....	47 57.7	14 46.7 E.	352	980.750		Kolberg.....	54 11.3	15 35.8 E.	8	981.453	
Wien (base station).....	48 12.7	16 21.5 E.	183	980.860		Königsberg (Sternwarte).....	54 42.8	20 29.8 E.	22	981.477	
Wolfsthal.....	48 8.3	17 0.5 E.	146	980.904		Leipzig.....	51 20.1	12 23.5 E.	115	981.180	
Belgium (2)						Lüdenhausen.....	52 4.3	9 0.0 E.	205	981.242	
Brussels.....	50 51.0	4 22 E.	102	981.112		Munich.....	48 8.7	11 36.6 E.	525	980.733	
Czechoslovakia (2)						Münster.....	51 57.9	7 37.9 E.	62	981.233	
Böhmerwald.....	49 40.1	12 59.3 E.	537	980.921		Neumünster.....	54 4.4	10 0 E.	25	981.427	
Cebon.....	50 0.9	13 0.4 E.	822	980.906		Potsdam (Geodetic Institute, base station).....	52 22.9	13 4.1 E.	87	981.274	
						Scharfenstein.....	51 50.0	10 36.0 E.	623	981.130	+0.041
						Schneekoppe.....	50 44.2	15 44.6 E.	1605	980.776	+0.110
						Schlaggrund.....	52 52.8	15 48.0 E.	109	981.278	
						Stuttgart.....	48 46.9	9 10.5 E.	247	980.901	
						Waldsee.....	47 55	9 45.3 E.	590	980.706	

Station	Latitude	Longitude	h	σ	TC	Station	Latitude	Longitude	h	σ	TC
Great Britain (2)						Norway (2, 6)					
Edinburgh, Scotland (Observatory).....	55° 57.4'	3° 9.4'	104	981.584		Bergen (Sternwarte)...	60° 23.9'	5° 18.3' E.	38	981.922	
Glasgow, Scotland (University).....	55 51.5	4 14.0	61	981.605		Christiansund.....	63 6.6	7 44.2 E.	20	982.175	
Greenwich, England (Observatory).....	51 28.6	0 0.0	48	981.184		Dambaa.....	62 4.6	9 8.3 E.	643	981.892	
Kew, England (Observatory).....	51 28.1	0 19	5	981.144		Florø.....	61 35.8	5 2.4 E.	10	982.071	
Plymouth, England.....	50 22.2	4 8.4	43	981.148		Langenes.....	69 1.2	15 8.7 E.	8	982.640	
Holland, see Netherlands						Laredal.....	61 6.3	7 27.9 E.	7	981.942	
Hungary (2)						Mehavn.....	71 1.3	27 47 E.	10	982.688	
Budapest.....	47 29.5	19 3.6 E.	108	980.852		Osla (Christiania) (Sternwarte, base station).....	59 54.7	10 43.5 E.	28	981.927	
Kis-Komárom.....	46 32.9	17 10.7 E.	115	980.745		Oxö.....	58 4.3	8 3.5 E.	10	981.763	
Italy (2, 6)						Rörvik.....	64 51.9	11 14.3 E.	10	982.313	
Alba.....	44 42.0	8 2.3 E.	169	980.444		Sand.....	59 29.1	6 15.7 E.	14	981.853	
Arona.....	45 45.8	8 34.1 E.	210	980.629		Sannesjøen.....	66 1.3	12 38.8 E.	12	982.351	
Bologna (Università).....	44 29.8	11 21.3 E.	51	980.450		Sörvaagen.....	67 53.6	13 2 E.	19	982.622	+0.0
Brenner (see Austria)						Stavanger.....	58 58	5 44.3 E.	11	981.845	
Catania, Sicily.....	37 30.2	15 4.7 E.	43	980.065		Triset.....	59 25.8	8 10.8 E.	115	981.795	
Castellammare di Stabia.....	40 41.6	14 28.7 E.	4	980.321		Österreich, see Austria.					
Domo d'Ossola.....	46 7.0	8 18.4 E.	276	980.598		Olanda, see Netherlands.					
Florence.....	43 46.8	11 15.2 E.	48	980.510		Paesi Bassi, see Netherlands.					
Genoa (Istituto Idrografico).....	44 25.1	8 55.3 E.	93	980.573		Pays-Bas, see Netherlands.					
Livorno (Leghorn).....	43 32.0	10 18.5 E.	6	980.534	-0.018	Poland (2)					
Milan (Osservatorio).....	45 28.0	9 11.5 E.	141	980.569		Bedzin.....	50 19.3	19 8.7 E.	256	981.058	
Padua (Osservatorio, base station).....	45 24.0	11 52.3 E.	19	980.658		Kraków (Sternwarte).....	50 3.9	19 57.6 E.	205	981.054	
Palermo, Sicily.....	38 6.9	13 22.0 E.	20	980.069		Lwów (Lemberg).....	49 50.2	24 0.0 E.	314	980.911	
Pola.....	44 51.8	13 50.7 E.	28	980.626		Tuchla.....	48 55.2	23 29 E.	540	980.789	
Pracchia.....	44 3.0	10 54.3 E.	627	980.378		Portugal (18)					
Romagnano.....	45 38.1	8 23.8 E.	266	980.620		Camposancos.....	41 53.2	8 49.0	9	980.383	
Rome.....	41 53.5	12 29.7 E.	49	980.367	-0.012	Lisbon.....	38 42.5	9 11.3	75	980.088	
San Remo.....	43 49.1	7 46.5 E.	23	980.505		Oporto.....	41 8.2	8 36.1	94	980.290	
Stillsferjoch, see Austria						Praia da Rocha.....	37 7.0	8 32.7	17	980.005	
Stromboli, Lipari Is... ..	38 48.2	15 14.1 E.	48	980.212		Rumania (2)					
Turin.....	45 4.1	7 41.8 E.	233	980.549		Bocsa.....	46 56.9	22 42 E.	379	980.711	
Jugoslavia, see Yugoslavia						Bucharest (Bucuresti).....	44 24.6	26 6.8 E.	83	980.553	
Netherlands (24)						Eled.....	47 2.5	22 22 E.	225	980.794	
Amsterdam (Université).....	52 21.0	4 54.7 E.	0	981.288		Maros-Ludas (Ludos).....	46 28.1	24 6 E.	281	980.715	
Bergen op Zoom (Cathédrale).....	51 29.7	4 17.3 E.	10	981.212		Russia and Siberia (2, 11)					
Breda (Académie Militaire).....	51 35.5	4 46.5 E.	1	981.213		Alexandropol.....	40 47.0	43 49.7 E.	1519	979.785	
De Bilt (Institut Météorologique, base station).....	52 6.2	5 10.7 E.	2	981.267		Archangel.....	64 34	40 31.0 E.	5	982.278	
Delft (Institut Géodésique).....	52 0.6	4 22.1 E.	2	981.264		Astrakhan.....	46 21.0	48 2.7 E.	-21	980.774	
Gronigen (Université).....	53 13.2	6 34.0 E.	5	981.348		Byelgorod.....	50 36.1	36 35.9 E.	203	981.038	
Hollander (Sanatorium Hellendoorn).....	52 24.2	6 25.0 E.	11	981.296		Dagarskoje (L a k e Baikal), Siberia.....	55 42.2	109 54 E.	465	981.32	
Leeuwarden (Friesche Levensverzekering).....	53 12.3	5 48.3 E.	1	981.348		Erivan.....	40 10.7	44 32.8 E.	990	979.880	
Leiden (Observatoire).....	52 9.4	4 29.1 E.	2	981.273		Gorjatschinskoi, Siberia.....	52 59.4	108 18.0 E.	470	981.178	
Maastricht (Hôtel de Ville).....	50 51.2	5 41.6 E.	49	981.140		Irkutsk, Siberia (Meteorological Observatory).....	52 16.5	104 16.5 E.	470	981.096	
Middelburg (États Prov.).....	51 30.0	3 36.8 E.	6	981.215		Kasan (Observatory).....	55 47.4	49 7.3 E.	70	981.572	
Oldenzaal (Église Plechelmi).....	52 18.8	6 55.8 E.	47	981.282		Kingisepp.....	59 22.5	28 35.7 E.	16	981.858	
Schoorl (École primaire).....	52 42.1	4 41.6 E.	9	981.312		Leningrad, see St. Petersburg.....					
Sittard (Ambachtschool).....	50 59.8	5 51.6 E.	48	981.148		Lenkoran.....	38 45.6	48 51.5 E.	-20	980.092	
Sleen.....	52 46.5	6 48.1 E.	16	981.318		Listvinichnoe, Siberia.....	51 51.0	104 52.5 E.	465	981.051	
Terschelling (École Navale).....	53 21.6	5 12.9 E.	6	981.376		Moscow (Observatory).....	55 45.3	37 34.3 E.	139	981.562	
Ubagsberg.....	50 51.0	5 57.2 E.	191	981.108		Novgorod.....	58 31.4	31 17.3 E.	48	981.780	
Utrecht (Observatoire).....	52 5.2	5 7.8 E.	5	981.263		Odessa.....	46 26.4	30 46.4 E.	43	980.769	
Weert (Église catholique).....	51 15.3	5 42.5 E.	33	981.161		Pulkova (base station).....	59 46.3	30 19.7 E.	71	981.899	
Winachten.....	53 8.7	7 2.4 E.	0	981.346		St. Petersburg (Leningrad).....	59 56.5	30 17.7 E.	3	981.929	
						Schaitanskij.....	56 54.8	59 57.0 E.	310	981.641	
						Simbirsk.....	54 19.0	48 24.2 E.	181	981.469	
						Staraya Russa.....	57 59.4	31 22 E.	23	981.747	
						Tartu (Dorpat, Yuriev), (Observatory).....	58 22.8	26 43.2 E.	50	981.793	
						Tiflis (Physical Observatory).....	41 43.1	44 47.8 E.	412	980.176	
						Tver.....	56 51.2	35 50.9 E.	136	981.607	
						Verevye.....	58 40.8	32 42.0 E.	113	981.794	
						Volkhovo.....	59 4.2	31 46.2 E.	21	981.826	
						Vyshniy Volochok.....	57 35.1	34 33.1 E.	164	981.695	
						Vologda.....	59 13	39 53.0 E.	118	981.837	
						Schweden, see Sweden					
						Schweiz, see Switzerland					
						Scotland, see Great Britain					

Station	Latitude	Longitude	h	g	TC	Station	Latitude	Longitude	h	g	TC
Spain (18)						Ungarn, see Hungary.					
Alcázar de San Juan...	39° 24.0'	3° 12.0'	648	979.933		Ungheria, see Hungary.					
Andájar...	38 3.0	4 3.0	207	979.943		Yugoslavia (2)					
Aranda de Duero...	41 40.0	3 40.0	801	980.086		Marburg (Maribor)...	46° 34'	15° 39' E.	270	980.708	
Arbas...	43 0.9	5 45.0	1320	980.132		Ragusa (Dubrovnik)...	42 38.6	18 6 E.	47	980.394	
Badajoz...	38 53.0	6 58.0	188	980.050		Serajevo...	43 48.2	18 19.7 E.	511	980.382	
Barcelona...	41 25.0	2 7.0 E.	407	980.240		ASIA					
Baza...	37 30.0	2 45.0	858	979.669		Giappone, see Japan.					
Cortegana...	37 54.0	6 47.0	765	979.895		China (2)					
Daroca...	41 7.0	1 25.0	770	980.038		Hankow...	30 35.5	114 17.5 E.	73(?)	979.369	
Lérida...	41 37.0	0 38.0 E.	165	980.260		Hongkong...	22 18.2	114 10.5 E.	33	978.771	
Llanés...	42 22.0	3 9.0 E.	6	980.431		Port Arthur...	38 47.9	121 22.3 E.	1	980.128	
Málaga...	36 43.0	4 25.2	61	979.918		Shasi...	30 18.1	112 14.8 E.	122(?)	979.303	
Plasencia...	40 2.0	6 3.0	369	980.073		Weihaiwei...	37 30.0	122 11.0 E.	1	979.993	
Puigcerdá...	42 25.0	1 54.7 E.	1190	980.055		Zikawei, Observatory...	31 11.6	121 25.8 E.	4	979.437	
Roncal...	42 49.0	0 59.6	675	980.228		India (2, 3)					
Salamanca...	40 58.0	5 39.0	805	980.057		Agra...	27 10.3	78 1.1 E.	163	979.058	-0.018
Salou...	41 4.0	1 9.0 E.	2	980.268		Allahabad...	25 25.9	81 55.5 E.	88	978.945	-0.021
San Fernando...	36 28.0	6 12.3	44	979.843		Badnur...	21 54.2	77 54.2 E.	641	978.609	+0.018
Santander...	43 29.1	3 49.0	10	980.503		Chatra...	24 12.7	88 23.4 E.	20	978.880	-0.019
Seville...	37 23.0	5 59.0	11	979.965		Colaba...	18 53.8	72 48.8 E.	10	978.633	0.000
Tarifa...	36 0.0	5 37.0	29	979.748		Cuttack...	20 29.1	85 52.0 E.	28	978.661	0.000
Toledo...	39 51.0	4 1.0	520	980.015		Dehra Dun...	30 19.5	78 3.2 E.	682	979.065	-0.080
Torrejón...	38 0.1	0 39.1	2	980.032		Dohpur...	26 42.0	77 54.8 E.	176	979.001	-0.015
Valencia...	39 29.0	0 23.0	6	980.127		Gesupur...	28 33.0	77 42.0 E.	211	979.127	-0.025
Valladolid...	41 39.0	4 43.0	695	980.111		Jacobabad...	28 16.6	68 27.1 E.	56	979.188	-0.024
Vivero...	43 39.0	7 35.0	12	980.553		Jalpaiguri...	26 31.3	88 44.2 E.	82	978.924	-0.093
Suede, see Sweden.						Jubbulpore...	23 8.9	79 59.5 E.	447	978.721	-0.002
Suisse, see Switzerland.						Kalianpur...	24 7.2	77 39.3 E.	537	978.779	+0.011
Svezia, see Sweden.						Madras...	13 4.1	80 14.9 E.	6	978.281	+0.040
Svizzera, see Switzerland.						Majhauri...	26 17.8	83 58.5 E.	67	978.930	-0.037
Sweden (2)						Mian Mir...	31 31.6	74 22.5 E.	216	979.385	-0.033
Haparanda...	65 49.7	24 9.6 E.	4	982.337		Moghal Sarai...	25 17.0	83 6 E.	78	978.921	-0.024
Härnösand...	62 37.8	17 57.0 E.	25	982.082		Montgomery...	30 39.8	73 6.3 E.	170	979.323	-0.019
Lund (Sternwarte)...	55 41.9	13 11.3 E.	32	981.564		Mussoorie (Camel's Back)...	30 27.6	78 4.5 E.	2110	978.795	+0.032
Stockholm (Sternwarte, base station)...	59 20.6	18 3.5 E.	45	981.843		Musaffarpur...	26 7.1	85 25.5 E.	55	978.936	-0.038
Uppsala (Sternwarte)...	59 51.5	17 37.6 E.	20	981.910		Quetta...	30 12.2	67 0.7 E.	1682	978.853	+0.024
Switzerland (2, 23)						Rajpur...	21 13.9	81 41 E.	304	978.614	+0.001
Basel (base station)...	47 33.6	7 34.8 E.	277	980.788		Rajpur...	30 24.2	78 5.8 E.	1012	979.004	-0.066
Bern (Landestopographie)...	46 56.5	7 26.8 E.	522	980.622		Sandakphu Peak...	27 6.1	88 0.2 E.	3586	978.192	+0.141
Bionico...	46 7.4	8 55.7 E.	473	980.580		Yercaud...	11 46.9	78 12.5 E.	1369	977.910	+0.116
Brusio...	46 15.3	10 7.7 E.	721	980.429		Japan (2, 4)					
Burgdorf (Technikums)...	47 3.5	7 37.2 E.	558	980.633		Aomori...	40 49	140 45 E.	1	980.325	
Chanion (Klubhütte)...	45 56.3	7 22.9 E.	2435	980.107	+0.113	Chofu...	34 0	131 0 E.	6	979.691	
Eggishorn (Hotel Jungfrau)...	46 25.2	8 6.8 E.	2187	980.169	+0.086	Fukushima...	37 45	140 27 E.	67	980.022	
Frauenfeld (Kantonschule)...	47 33.3	8 54.2 E.	431	980.703		Fukuyama...	34 30	133 22.5 E.	3	979.711	
Fribourg (Universität)...	46 47.6	7 9.4 E.	633	980.584		Hachinohe...	40 31	141 30 E.	21	980.359	+0.049
Gornergrat...	45 59.0	7 46.8 E.	3016	979.992	+0.165	Hamada...	34 54	132 6 E.	3	979.768	
Grand St. Bernard...	45 52.1	7 10.4 E.	2473	980.072	+0.131	Hamamatsu...	34 42.9	137 43 E.	31	979.750	
Geneva (Sternwarte)...	46 12.0	6 9.2 E.	402	980.592		Himeji...	34 50.1	134 42 E.	16(?)	979.754	
Gsteig (Hotel Sanetsch)...	46 23.2	7 56.2 E.	1185	980.396	-0.001	Kamakura...	35 19.2	139 34 E.	13	979.779	
Landquart (Schulhaus)...	46 57.8	9 32.6 E.	520	980.523		Kofu...	35 39	138 35 E.	270	979.719	
Lausanne (Ecole de Chimie et de Physique)...	46 31.5	6 38.2 E.	531	980.599		Kurume...	33 19.3	130 31.6 E.	11	979.618	
Les Verrières...	46 54.3	6 28.8 E.	928	980.573		Kyoto...	35 1.6	135 47.1 E.	55	979.727	
Lungern (Schulhaus)...	46 47.1	8 9.6 E.	714	980.515		Matsue...	35 30	133 3 E.	23	979.812	
Luzern (Kantonschule)...	47 3.0	8 18.2 E.	434	980.626		Matsuyama...	33 50	132 45 E.	19	979.607	
Neuchâtel (Sternwarte)...	47 0.1	6 57.3 E.	487	980.653	-0.026	Mizusawa...	39 8.1	141 8 E.	61	980.159	
Rivera...	46 7.4	8 55.7 E.	473	980.580		Nagasaki...	32 44.7	129 52.3 E.	30	979.594	
St. Maurice (Hotel du Simplon)...	46 13.0	7 0.2 E.	422	980.512	-0.130	Nagoya...	35 10.4	136 53 E.	14	979.756	
Simplonhospis...	46 14.9	8 1.9 E.	1998	980.202	+0.076	Nikko...	36 44	139 38 E.	649	979.780	
Sion (Collège)...	46 14.1	7 21.5 E.	514	980.480	-0.082	Okasaki...	34 57.4	137 10 E.	25	979.764	
Stilfserjoch, see Austria.						Shizuoka...	34 58.4	138 23 E.	23	979.753	
Truns (Schulhaus)...	46 44.6	8 59.4 E.	859	980.432		Tokyo (base station)...	35 42.6	139 46.0 E.	18	979.801	
Zermatt...	46 1.5	7 45.0 E.	1603	980.250	-0.007	Tsukuba...	36 13.4	140 5.8 E.	870	979.781	
Zerns (Schloss)...	46 42.0	10 5.8 E.	1473	980.308		Uwajima...	33 13	132 34.5 E.	2	979.597	
Zürich...	47 22.7	8 33.1 E.	463	980.676		Wakayama...	34 14.2	135 11.0 E.	3	979.704	
Tcheco-Slovaquie, see Czechoslovakia.						Yamada...	34 29.6	136 42.8 E.	4	979.727	
						Yamagata...	38 15	140 16 E.	153	980.027	
						Siam (2, 3, 6)					
						Bankok...	13 43.9	100 29.4 E.	7	978.278	
						Siberia, (see Russia, p. 398).					
						Turkestan (2, 4)					
						Derbent, Bokhara...	38 12.0	67 3.2 E.	1012	979.672	
						Kala Khum, Bokhara...	38 27.3	70 46.5 E.	1345	979.462	-0.086
						Samarkand...	39 39.1	66 58.7 E.	719	979.883	
						Sultan-Bend...	37 7.5	62 28.0 E.	272	979.798	
						Tashkent...	41 19.5	69 17.7 E.	478	980.086	
						Chardshui (International Latitude Station)...	39 6.2	63 36.1 E.	192	980.014	

Station	Latitude	Longitude	h	g	TC	Station	Latitude	Longitude	h	g	TC
AFRICA						Perth.....	31° 57.1' S.	115° 50.5' E.	58	979.378	
Egypt and Anglo-Egyptian Sudan (10)						Sydney.....	33 51.7 S.	151 12.7 E.	43	979.680	
						OCEANIC					
						Atlantic Ocean and Mediterranean Sea (2, 3, 6, 10)					
Abu Hamed.....	19° 32.0'	33° 19.9' E.	339	978.538		Bastia, Corsica.....	42 41.2	9 27 E.	20	980.519	
Aswan.....	24 5.1	32 53.1 E.	97	978.879		Bridgetown, Barbados.	13 4.3	59 36.5	2	978.340	
Atbara.....	17 41.9	33 58.9 E.	354	978.421		Catania, Sicily.....	37 30.2	15 4.7 E.	43	980.065	
Helwan.....	29 51.5	31 20.4 E.	104	979.295		Fornells, Balearic Islands.....	40 3.4	4 7.9 E.	7	980.283	
Khartum.....	15 36.6	32 32.9 E.	383	978.308		Ibiza, Balearic Islands.	38 54.3	1 26.1 E.	3	980.146	
Luxor.....	25 43.1	32 39.3 E.	82	978.982		Jamestown, St. Helena	15 55 S.	5 43.7	10	978.712	+0.177
Minia.....	28 5.8	30 45.5 E.	42	979.155		Karajak Glacier, Greenland.....	70 26.9	50 19.8	20	982.534	
Wadi Halfa.....	21 55.8	31 19.9 E.	126	978.728		Kingston, Jamaica....	17 57.7	76 47.3	2	978.591	
Red Sea (2)						Las Palmas, Canary Islands.....	28 7.0	15 26.0	8	979.385	
Aden.....	12 47.3	44 59.3 E.	5	978.327		Palermo, Sicily.....	38 6.9	13 22.0 E.	20	980.069	
Harmil Island, Dahlak Archipelago Eritrea.....	16 28.8	40 8.7 E.	4	978.465		Palma de Mallorca, Balearic Islands....	39 34.5	2 39.1 E.	23	980.179	
St. John Island (Zebirget).....	23 35.8	36 12.0 E.	6	979.026		Ponta Delgada, Azores	37 43.8	25 40.8	4	980.143	
Mersa Dhiba.....	25 20.2	34 44.3 E.	2	979.007		Reykjavik, Iceland....	64 8.5	22 0.3	39	982.273	
Sherm Sheikh (Sinai).	27 51.1	34 16.9 E.	2	979.174		St. George, Bermuda..	32 21	64 40	2	979.806	+0.218
Suez.....	29 56.0	32 33.4 E.	3	979.307		Santa Cruz de la Palma, Canary Islands.....	28 41.0	17 46.0	12	979.459	
Sudan, see Egypt.						Stromboli, Lipari Islands.....	38 48.2	15 14.1 E.	48	980.212	
Miscellaneous (2, 3)						Whales Point, Spitzbergen.....	77 30.4	20 58.8 E.	458(?)	982.899	
Algiers (Observatory).	36 44.8	3 3 E.	213	979.905		Valetta, Malta.....	35 53.8	14 31.3 E.	62	979.887	
Biserta, Tunisia.....	37 16.4	9 52.5 E.	7	979.975		Indian Ocean, see Pacific Ocean.					
Biskra, Algeria.....	34 50.9	5 43 E.	137	979.617		Mediterranean Sea, see Atlantic Ocean.					
Cape Town, U. S. Af. (Observatory).....	33 56.1 S.	18 28.7 E.	11	979.657		Pacific and Indian Oceans (2, 3, 6)					
Dar-es-Salaam, Tanganyika Ter.....	6 49.0 S.	39 18.0 E.	7	978.117		Auckland, New Zealand.....	36 50.9 S.	174 46.2 E.	3	979.962	
Domjo Ndorobbo.....	3 08.8 S.	35 13.2 E.	1715	977.549		Batavia, Java (Observatory).....	6 11.0 S.	106 49.8 E.	7	978.178	
Freetown, Sierra Leone	8 29.4	13 14.3	65	978.200		Hobart, Tasmania (Observatory).....	42 53.6 S.	147 22.0 E.	58	980.441	
E. Usso Nyiro, Kenya	1 53.1 S.	36 8.2 E.	676	977.737		Honolulu, Territory of Hawaii (Observatory).....	21 18.1	157 51.8	6	978.946	+0.162
Johannesburg, U. S. Af. (Observatory)...	26 10.9 S.	28 4.5 E.	1805	978.553		Kudat, British North Borneo.....	6 53.0	116 50.7 E.	2	978.149	
Kampo, Cameroons, Fr. Equat. Af.....	2 21.2	9 49.6 E.	3	978.040		Makassar, Celebes....	5 7.3 S.	119 24.5 E.	2	978.138	
Laghwat, Algeria.....	33 47.7	2 53 E.	755	979.356		Manila, Philippines...	14 34.7	120 38.6 E.	3	978.360	
Langenburg, U. S. Af.	9 35.8 S.	34 8.6 E.	477	977.907		Marau-Sound, Solomon Islands.....	9 49.1 S.	160 48.5 E.	3	978.349	
Libreville, Gabon, Fr. Equat. Af.....	0 22.3	9 27.2 E.	2	977.999		Mauna Kea, Hawaiian Islands.....	19 49.2	155 28.8	3981	978.069	+0.469
Loanda, Angola, Portuguese W. Af.....	8 48.6 S.	13 14.1 E.	4	978.212		Numea, New Caledonia.....	22 16.6 S.	166 27.8 E.	2	978.877	
Lourenço Marques, Mozambique, Portuguese E. Af. (Observatory).....	26 2.5 S.	32 19.8 E.	55	979.068		Singapore, Straits Settlements.....	1 16.5	103 50.3 E.	21	978.082	
Lüderitz Bay, Southwest Af.....	26 38.8 S.	15 9.7 E.	2	979.103		Port Vila, Sandwich Island, New Hebrides.....	17 45.0 S.	168 19.0 E.	3	978.637	
Monrovia, Liberia....	6 19.0	10 48.8	41	978.165		Winter Quarters, Kaiser Wilhelm II Land.....	66 2.2 S.	89 38.1 E.	1	982.388	
Mozambique, Portuguese E. Af.....	15 2.1 S.	38 25 E.	3	978.451							
Ouled Rhamoun, Algeria.....	36 10.8	6 41 E.	687	979.709							
Pangani, Tanganyika Ter.....	5 25.8 S.	38 58.8 E.	7	978.039							
Rio del Rey, Nigeria..	4 43.5	8 38.3 E.	2	978.087							
Tangier, Morocco....	35 46.5	5 48.6	63	979.737							
AUSTRALIA (2, 3, 19)											
Brisbane (Observatory).....	27 28.0 S.	153 1.6 E.	40	979.148							
Hobart, Tasmania (Observatory).....	42 53.6 S.	147 22.0 E.	58	980.441							
Melbourne (Observatory).....	37 49.9 S.	144 58.5 E.	26	979.987							

TABLE 2.—ACCELERATION OF GRAVITY AT SEA-LEVEL (g_0)

$g_0 = 978.039 (1 + 0.005294 \sin^2 \varphi - 0.000007 \sin^2 2\varphi)^*$; Bowie (⁶). φ = latitude. Unit of g_0 is cm/sec². Basis: Potsdam system

φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²	φ	g_0 cm/sec ²
0° 00'	978.039	10° 00'	978.194	20° 00'	978.642	30° 00'	979.328	40° 00'	980.172	50° 00'	981.071	60° 00'	981.917	70° 00'	982.608	80° 00'	983.060
10	.039	10	.199	10	.652	10	.341	10	.186	10	.086	10	.930	10	.618	10	.065
20	.039	20	.205	20	.661	20	.354	20	.201	20	.100	20	.943	20	.628	20	.070
30	.039	30	.210	30	.671	30	.368	30	.216	30	.115	30	.956	30	.637	30	.075
40	.040	40	.215	40	.681	40	.381	40	.231	40	.130	40	.969	40	.647	40	.080
50	.040	50	.221	50	.691	50	.394	50	.246	50	.145	50	.982	50	.656	50	.085
1 00	978.041	11 00	978.227	21 00	978.701	31 00	979.407	41 00	980.261	51 00	981.160	61 00	981.995	71 00	982.665	81 00	983.089
10	.041	10	.232	10	.711	10	.420	10	.276	10	.174	10	.982.008	10	.675	10	.094
20	.042	20	.238	20	.721	20	.434	20	.291	20	.189	20	.020	20	.684	20	.099
30	.043	30	.244	30	.731	30	.447	30	.306	30	.204	30	.033	30	.693	30	.103
40	.043	40	.250	40	.742	40	.460	40	.321	40	.218	40	.046	40	.702	40	.107
50	.044	50	.256	50	.752	50	.474	50	.336	50	.233	50	.058	50	.711	50	.112
2 00	978.045	12 00	978.262	22 00	978.762	32 00	979.487	42 00	980.350	52 00	981.248	62 00	982.071	72 00	982.720	82 00	983.116
10	.046	10	.268	10	.773	10	.501	10	.365	10	.262	10	.083	10	.729	10	.120
20	.048	20	.274	20	.783	20	.515	20	.380	20	.277	20	.096	20	.738	20	.124
30	.049	30	.280	30	.794	30	.528	30	.395	30	.292	30	.108	30	.746	30	.128
40	.050	40	.287	40	.804	40	.542	40	.410	40	.306	40	.121	40	.755	40	.132
50	.052	50	.293	50	.815	50	.555	50	.425	50	.321	50	.133	50	.764	50	.136
3 00	978.053	13 00	978.300	23 00	978.826	33 00	979.569	43 00	980.440	53 00	981.335	63 00	982.145	73 00	982.772	83 00	983.139
10	.055	10	.306	10	.837	10	.583	10	.455	10	.350	10	.157	10	.780	10	.143
20	.056	20	.313	20	.848	20	.597	20	.471	20	.364	20	.169	20	.789	20	.147
30	.058	30	.320	30	.859	30	.611	30	.486	30	.379	30	.182	30	.797	30	.150
40	.060	40	.327	40	.870	40	.624	40	.501	40	.393	40	.194	40	.805	40	.153
50	.062	50	.334	50	.881	50	.638	50	.516	50	.407	50	.206	50	.813	50	.157
4 00	978.064	14 00	978.341	24 00	978.892	34 00	979.652	44 00	980.531	54 00	981.422	64 00	982.218	74 00	982.821	84 00	983.160
10	.066	10	.348	10	.903	10	.666	10	.546	10	.436	10	.229	10	.829	10	.163
20	.068	20	.355	20	.914	20	.680	20	.561	20	.450	20	.241	20	.837	20	.166
30	.071	30	.362	30	.926	30	.694	30	.576	30	.465	30	.253	30	.845	30	.169
40	.073	40	.369	40	.937	40	.708	40	.591	40	.479	40	.265	40	.853	40	.172
50	.076	50	.377	50	.948	50	.722	50	.606	50	.493	50	.276	50	.861	50	.175
5 00	978.078	15 00	978.384	25 00	978.960	35 00	979.736	45 00	980.621	55 00	981.507	65 00	982.288	75 00	982.868	85 00	983.177
10	.081	10	.392	10	.971	10	.751	10	.636	10	.521	10	.300	10	.876	10	.180
20	.083	20	.399	20	.983	20	.765	20	.651	20	.536	20	.311	20	.883	20	.182
30	.086	30	.407	30	.994	30	.779	30	.666	30	.550	30	.322	30	.891	30	.185
40	.089	40	.415	40	.999.006	40	.793	40	.681	40	.564	40	.334	40	.898	40	.187
50	.092	50	.423	50	.018	50	.807	50	.696	50	.578	50	.345	50	.905	50	.189
6 00	978.095	16 00	978.430	26 00	979.030	36 00	979.822	46 00	980.711	56 00	981.592	66 00	982.356	76 00	982.912	86 00	983.191
10	.098	10	.438	10	.042	10	.836	10	.726	10	.606	10	.368	10	.919	10	.193
20	.102	20	.446	20	.054	20	.850	20	.741	20	.620	20	.379	20	.926	20	.195
30	.105	30	.455	30	.065	30	.865	30	.757	30	.634	30	.390	30	.933	30	.197
40	.108	40	.463	40	.077	40	.879	40	.772	40	.648	40	.401	40	.940	40	.199
50	.112	50	.471	50	.090	50	.894	50	.787	50	.661	50	.412	50	.947	50	.201
7 00	978.115	17 00	978.479	27 00	979.102	37 00	979.908	47 00	980.802	57 00	981.675	67 00	982.423	77 00	982.953	87 00	983.202
10	.119	10	.488	10	.114	10	.922	10	.817	10	.689	10	.434	10	.960	10	.204
20	.123	20	.496	20	.126	20	.937	20	.832	20	.703	20	.444	20	.967	20	.205
30	.127	30	.505	30	.138	30	.951	30	.847	30	.716	30	.455	30	.973	30	.207
40	.131	40	.514	40	.151	40	.966	40	.862	40	.730	40	.466	40	.979	40	.208
50	.135	50	.522	50	.163	50	.981	50	.877	50	.744	50	.476	50	.986	50	.209
8 00	978.139	18 00	978.531	28 00	979.175	38 00	979.995	48 00	980.892	58 00	981.757	68 00	982.487	78 00	982.992	88 00	983.210
10	.143	10	.540	10	.186	10	.980.010	10	.907	10	.771	10	.497	10	.998	10	.211
20	.147	20	.549	20	.200	20	.024	20	.922	20	.784	20	.508	20	.983.004	20	.212
30	.152	30	.558	30	.213	30	.039	30	.937	30	.798	30	.518	30	.010	30	.213
40	.156	40	.567	40	.226	40	.054	40	.952	40	.811	40	.528	40	.016	40	.214
50	.160	50	.576	50	.238	50	.068	50	.967	50	.825	50	.539	50	.022	50	.215
9 00	978.165	19 00	978.585	29 00	979.251	39 00	980.083	49 00	980.981	59 00	981.838	69 00	982.549	79 00	983.027	89 00	983.215
10	.170	10	.594	10	.264	10	.098	10	.996	10	.851	10	.559	10	.033	10	.216
20	.174	20	.604	20	.277	20	.113	20	.981.011	20	.865	20	.569	20	.038	20	.216
30	.179	30	.613	30	.290	30	.127	30	.026	30	.878	30	.579	30	.044	30	.216
40	.184	40	.623	40	.302	40	.142	40	.041	40	.891	40	.589	40	.049	40	.217
50	.189	50	.632	50	.315	50	.157	50	.056	50	.904	50	.598	50	.055	50	.217
																90 00	983.217

* This formula differs slightly (not over one in 100 000) from that proposed by Helmert (¹⁴) and quite extensively used. A table similar to this, but based on Helmert's formula is given by Albrecht (¹).

D. VARIATION OF GRAVITY WITH ELEVATION AND DEPTH

Elevation; Free Air Method.—If there were no matter projecting above the geoid and the geoid were a smooth ellipsoid of revolution, then the value (g_H) of the acceleration of gravity (cm/sec²) at a height H meters above the surface would be related (15, 16) to that (g_0) at the surface, as indicated by equation (1), in which φ is the latitude.

$$g_H = g_0 - (0.000\ 308\ 55 + 0.000\ 000\ 22\cos 2\varphi)H + 0.000\ 072 \left(\frac{H}{1000}\right)^2 \quad (1)$$

This is known as the free air correction. For most purposes it is sufficient to use the approximate formula (2).

$$g_H = g_0 - 0.000\ 3086\ H \quad (2)$$

If g_0 is taken from Table 2, the value of g_H obtained for any station by the use of equation (1) will agree fairly well with the true acceleration, if the surrounding topography is not too rugged. In a fairly flat country, the difference will be considerably less than 0.1 cm/sec², except in very rare cases; and even in a mountainous country, the difference will ordinarily be less than 0.2 cm/sec². For stations below sea-level, but not below the surface of the earth, the same formulae apply; but for such stations, H is negative.

More Exact Methods.—In mountainous country, the computed value will be practically as close to the true value as in flat country if an additional term is added to the right hand side of equation (1), to take account of the elevation of the place above or below the general level of the topography within a radius of, say, approximately 160 km. For every 10 m the place in question is above the general level, this term amounts to 0.001 cm/sec², and for every 10 m below the general level, it amounts to -0.001 cm/sec². In computing the height of a coast station above the general level, the water must be considered replaced by an equal mass of rock, of average surface density, resting on the bottom of the ocean.

If it is desired to obtain a somewhat better value for the computed gravity at a place, the correction term just mentioned must be replaced by a correction for topography and isostatic compensation, computed by the method of John F. Hayford (12).

A somewhat larger error should be expected in the computed values of gravity on oceanic islands than on the continents. The rocks forming these islands are evidently somewhat heavier than normal in many cases, or the ocean is over-compensated, and the observed values of gravity are therefore usually larger than the computed values. In such cases, an error of 0.3 cm/sec², or possibly even 0.4 cm/sec² in computed values may be expected.

Depth.—As the density of the crust is less than two-thirds the mean density of the earth, the acceleration of gravity increases as we advance into the crust. The mean rate of increase is 0.000 0851 cm/sec² per meter of depth. The actual rate at any place depends upon the density of the crustal material in that locality, and is approximately given by the formula (13, 17)

$$g_d = g_0 + (0.000\ 3086 - 0.000\ 0837\rho)d \quad (3)$$

where g_d = acceleration of gravity (cm/sec²) at the depth of d m, and ρ = density (g/cm³).

LITERATURE

(For a key to the periodicals see end of volume)

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AERODYNAMICS

L. J. BRIGGS AND H. L. DRYDEN

Problems in aerodynamics cannot be idealized with the same readiness as problems in mechanics. The side of a building may not be regarded as a thin, flat plate for the purpose of computing the force of the wind, and data for a cylinder of a particular length cannot be directly applied for computing the wind force on a cylinder of some other length. Nearby objects exert an influence which cannot be neglected.

Results obtained for a particular object can be applied strictly only to geometrically similar (definition 6) objects in similar surroundings. Many of the apparent discrepancies among the results of different experimenters are to be attributed to departures from geometrical similarity of the models, to the effects of the supports or other nearby objects, and to differences in the fine structure (turbulence) of the approximately steady air streams, rather than to errors in measuring the force or wind speed. It is not possible to discuss these matters in detail here, and there is no complete discussion available for reference.

SYMBOLS

A	Some specified area	C_M	Moment coefficient (see paragraph on air foils)
A_r	Aspect ratio	C_N	Coefficient of force normal to the plane of reference
C	A coefficient	C_P	Coefficient of power (input)
C_{cp}	Coefficient of center of pressure		
C_d	Coefficient of drag		
C_l	Coefficient of lift		

CP	Coefficient of power out-put	$N. A.$	National Advisory Committee for Aeronautics, U. S. A.
C_Q	Coefficient of torque	$C. A.$	
C_{Qo}	Coefficient of torque load (output)	n	Number of revolutions per second
CT	Coefficient of force parallel to the plane of reference	P_o	Power developed (out-put)
C_t	Coefficient of thrust	P_i	Power input to propeller
$C. P.$	Center of pressure	$P. R.$	Pitch ratio
c	Length of chord of air-foil	p	Pressure at a point on a surface
D	Diameter	p_s	Static pressure of the air
F	Resultant wind force	Q	Torque
F_d	Drag = Component of F parallel to wind	Q_o	Torque load (output)
F_f	Frictional force	q	Dynamic pressure, as indicated by Pitot tube (Fig. 1)
F_l	Lift = Component of F normal to wind and to W	q_o	$\rho V^2/2$ (= q if there is no compression of the air)
F_N	Component of F normal to the plane of reference	R	Reynold's number
F_T	Component of F parallel to the plane of reference	S	That dimension of the plane of reference which is at right angles to the wind = Span
F_t	Thrust of propeller	T	Temperature
F_s	Any component of F	t	Thickness
L	Some linear dimension	V	Air speed relative to point considered
M	Moment of F about forward (leading) edge	V_i	Indicated air speed
		W	Width = That dimension of plane of ref-

ence which is normal to S ; i.e., makes least angle with wind	μ	Viscosity
x_c Distance in the plane of reference, from the leading edge, or its projection to $C. P.$	ρ	Density of air when undisturbed by bodies moving relatively to it.
η Efficiency	ρ_0	Conventionally chosen "standard" value of ρ
θ_A Angle of attack	ϕ	A definite but unspecified mathematical function

DEFINITIONS

1. Angle of Attack (θ_A) is the angle which the direction of the wind makes with the plane of reference; it is positive if the wind strikes what is the under side of this plane when the body is in its usual position.

2. Aspect ratio (A_r) = S/W .

3. Center of pressure ($C. P.$) of a body is that point, in the plane of reference, about which the resultant moment of the pressures is zero.

4. Chord (c). See paragraph on airfoils.

5. Coefficient of center of pressure (C_{cp}).

$$C_{cp} = x_c/W; \text{ for airfoil, } C_{cp} = x_c/c.$$

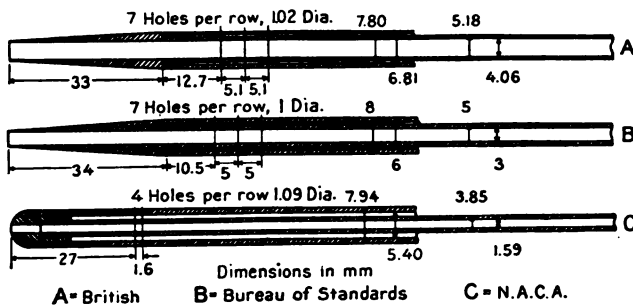


FIG. 1.—Standard Pitot-static tubes.

6. Geometrically similar systems. If two bodies together with their surroundings, are so related geometrically that one system corresponds exactly with a uniformly magnified image of the other, the two systems are said to be geometrically similar.

7. Indicated air speed (V_i) is defined by the relation $q = \rho V^2/2 = \rho_0 V_i^2/2$, where ρ_0 is the "standard" air density.

8. Mean temperature (T_m) of atmospheric air column below Z is that temperature for which the pressure at height Z in an isothermal column of air, pressure at bottom = 760 mm of mercury, would be that actually observed in the atmosphere at Z .

9. Pitch ratio ($P. R.$) $_x$ at any point of the blade of a propeller or of a wind-mill distant x from the axis of revolution is $(P. R.)_x = 2\pi x/D \tan \theta_x$, where D is the diameter of propeller or mill wheel, θ_x = angle which face of blade makes with plane of revolution. If $(P. R.)_x$ is independent of x , propeller has a constant pitch ratio; if θ_x is independent of x , it has a constant blade angle.

10. Reynold's number (R) = $VL\rho/\mu$, where L is some specified linear dimension. The choice of L depends upon the form of the object, and the problem. R is dimensionless.

CONSTANTS ASSUMED

Standard air density is $\rho_0 = 1.2255 \text{ kg/m}^3 (= 0.002377 \text{ slug/ft.}^3)$, which is essentially that of dry air, with normal CO_2 content, at 15°C and one atmosphere.

$$\mu/\rho = 1.427 \times 10^{-5} \text{ m}^2/\text{sec} (= 1.535 \times 10^{-4} \text{ ft.}^2/\text{sec}).$$

For geometrically similar systems $F_z = qL^2\phi(R) = CAq$ (43), where ϕ is independent of the actual size of the system, and q is the value of the dynamic pressure at some specified point. C is a function only of R and of the geometrical form of the system; its value is the same in every self-consistent system of units, and is independent of the actual size of the system. The data in the following tables and graphs apply when all surrounding bodies

are so far removed from the one considered that they produce no effect upon F_z .

Reduction of Observations.—To obtain true air speed from speed recorded by cup anemometer, use Table 1. Aerodynamic data are usually reduced to a standard air density (ρ_0). For q , this reduction can be effected by replacing the true air speed (V) by the indicated air speed (V_i) (definition 7), and in most cases the same procedure is amply sufficient for C . *Example:* If $V = 100 \text{ ft./sec}$ in air at 30°C and 754 mm of mercury, $V/V_i = 1.030$ (Fig. 2); hence $V_i = 97.1 \text{ ft./sec}$ and $q_0 = 11.20 \text{ lb./ft.}^2$ (Table 2). Owing to isentropic compression of air at this speed, the actual dynamic pressure (q) is $11.20/0.998$ (Table 3) = $11.22 \text{ lb./ft.}^2 = 54.78 \text{ kg/m}^2$.

As a basis for the calibration of altimeters, and for use in the comparison of the performances of aircraft, it is assumed that (1) below a certain altitude (Z_i), the rate of decrease (a) of the temperature (T) with the altitude is a constant; (2) above Z_i , $a = 0$; (3) at $Z = 0$, pressure = p_0 , temperature = T_0 . The temperature at $Z_i = T_i$; the mean temperature below Z is T_m . All temperatures are reckoned from absolute zero. Then, if $Z < Z_i$, $T_m = aZ/\log_e(T_0/T)$; if $Z > Z_i$, $T_m = Z/\left(\frac{1}{a} \log_e \frac{T_0}{T_i} + \frac{Z - Z_i}{T_i}\right)$, and for any value of Z , $Z = K \frac{T_m}{T_0} \log_{10} \left(\frac{p_0}{p}\right)$.

The values of these constants define what is called the "standard" atmosphere. There is not entire agreement regarding the values which best represent the average atmospheric condition (28). Those adopted by the governmental aeronautic organizations of the U. S. A. and by many of those of Europe are $T_0 = 288^\circ\text{C}$, $T_i = 218^\circ\text{C}$, $p_0 = 760 \text{ mm}$ of mercury, $a = 6.500 \times 10^{-3}^\circ\text{C/m}$ ($= 1.9812 \times 10^{-3}^\circ\text{C/ft.}$), $Z_i = 10769 \text{ m}$ ($= 35332 \text{ ft.}$), $K = 19413.3 \text{ m}$ ($= 63691.8 \text{ ft.}$). These differ slightly from those adopted by the International Commission for Aerial Navigation (see p. 72).

TABLE 1.—ROBINSON CUP ANEMOMETER*

True air speed = V ; recorded speed = V_r . If unit is 1 mi./hr, $\log_{10} V = 0.079 + 0.9012 \log_{10} V_r$.

Unit is 1 mi./hr = 1.467 ft./sec = 0.4470 m/sec

V_r	V	V_r	V	V_r	V	V_r	V
1	1.20	26	22.6	51	41.5	76	59.4
2	2.24	27	23.4	52	42.2	77	60.1
3	3.23	28	24.2	53	42.9	78	60.8
4	4.18	29	24.9	54	43.7	79	61.5
5	5.12	30	25.7	55	44.4	80	62.2
6	6.03	31	26.5	56	45.1	81	62.9
7	6.93	32	27.3	57	45.9	82	63.6
8	7.81	33	28.0	58	46.6	83	64.3
9	8.69	34	28.8	59	47.3	84	65.0
10	9.55	35	29.5	60	48.0	85	65.7
11	10.4	36	30.3	61	48.7	86	66.4
12	11.3	37	31.1	62	49.5	87	67.1
13	12.1	38	31.8	63	50.2	88	67.8
14	12.9	39	32.6	64	50.9	89	68.5
15	13.8	40	33.3	65	51.6	90	69.2
16	14.6	41	34.1	66	52.3	91	69.9
17	15.4	42	34.8	67	53.0	92	70.6
18	16.2	43	35.6	68	53.8	93	71.3
19	17.0	44	36.3	69	54.5	94	72.0
20	17.8	45	37.1	70	55.2	95	72.7
21	18.6	46	37.8	71	55.9	96	73.4
22	19.4	47	38.5	72	56.6	97	74.0
23	20.2	48	39.3	73	57.3	98	74.7
24	21.0	49	40.0	74	58.0	99	75.4
25	21.8	50	40.7	75	58.7	100	76.1

* U. S. Weather Bureau type; diameter of cups = 4 in.; centers of cups are 6.72 in. from axis; V_r = 3 times linear speed of centers of cups (2, 22, 23).

TABLE 2.—DYNAMIC PRESSURE ($q = q_0$) FOR INDICATED AIR SPEED V_i

Air compression is negligible, and $q = q_0 = \rho_0 V_i^2/2$ if $V_i < 30$ m/sec (= 100 ft./sec); for greater speeds, q exceeds q_0 , see Table 3.
Metric units are m, kg, sec. English units are ft., lb., sec. 1 lb./ft.² = 4.882 kg/m²; 1 ft./sec = 0.3048 m/sec.

Metric	V_i	English	Metric	V_i	English	English							
q_0		q_0	q_0		q_0	V_i	q_0	V_i	q_0	V_i	q_0	V_i	q_0
0.063	1	0.00119	42.25	26	0.8038	51	3.093	76	6.868	101	12.13	126	18.88
0.250	2	0.00476	45.56	27	0.8668	52	3.215	77	7.050	102	12.37	127	19.18
0.562	3	0.01070	49.00	28	0.9322	53	3.340	78	7.234	103	12.61	128	19.48
1.00	4	0.0190	52.56	29	0.9999	54	3.467	79	7.421	104	12.86	129	19.79
1.56	5	0.0297	56.25	30	1.070	55	3.597	80	7.610	105	13.11	130	20.09
2.25	6	0.0428	60.06	31	1.143	56	3.729	81	7.801	106	13.36	131	20.40
3.06	7	0.0583	64.00	32	1.218	57	3.863	82	7.995	107	13.61	132	20.72
4.00	8	0.0761	68.06	33	1.295	58	4.000	83	8.191	108	13.87	133	21.03
5.06	9	0.0963	72.25	34	1.374	59	4.139	84	8.390	109	14.13	134	21.35
6.25	10	0.1189	76.56	35	1.457	60	4.280	85	8.591	110	14.39	135	21.67
7.56	11	0.1438	81.00	36	1.541	61	4.424	86	8.794	111	14.65	136	21.99
9.00	12	0.1712	85.56	37	1.628	62	4.571	87	9.000	112	14.91	137	22.32
10.56	13	0.2009	90.25	38	1.717	63	4.719	88	9.208	113	15.18	138	22.64
12.25	14	0.2330	95.06	39	1.808	64	4.870	89	9.418	114	15.45	139	22.97
14.06	15	0.2675	100.0	40	1.902	65	5.024	90	9.631	115	15.72	140	23.30
16.00	16	0.3044	105.1	41	1.999	66	5.179	91	9.846	116	16.00	141	23.64
18.06	17	0.3436	110.3	42	2.097	67	5.337	92	10.06	117	16.28	142	23.97
20.25	18	0.3852	115.6	43	2.198	68	5.498	93	10.28	118	16.56	143	24.31
22.56	19	0.4292	121.0	44	2.302	69	5.661	94	10.51	119	16.84	144	24.66
25.00	20	0.4756	126.6	45	2.408	70	5.826	95	10.73	120	17.12	145	25.00
27.56	21	0.5243	132.2	46	2.516	71	5.994	96	10.96	121	17.41	146	25.34
30.25	22	0.5755	138.1	47	2.627	72	6.164	97	11.18	122	17.70	147	25.69
33.06	23	0.6290	144.0	48	2.739	73	6.336	98	11.42	123	17.99	148	26.04
36.00	24	0.6849	150.1	49	2.855	74	6.511	99	11.65	124	18.28	149	26.40
39.06	25	0.7431	156.3	50	2.973	75	6.688	100	11.89	125	18.58	150	26.75

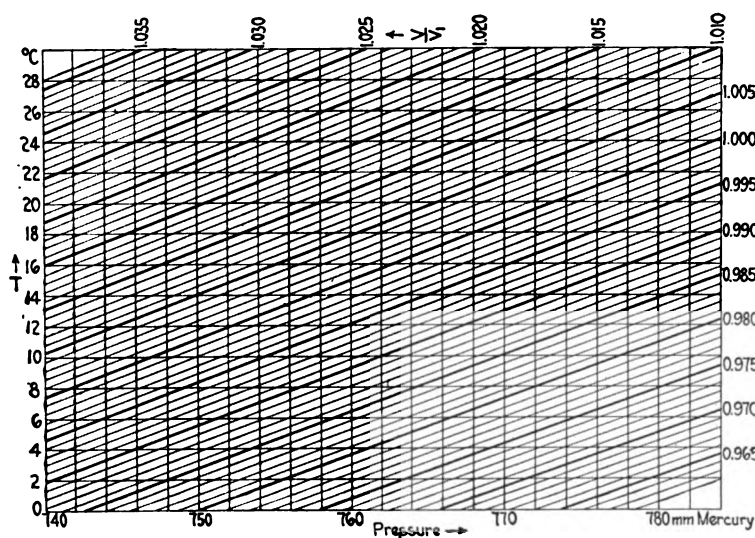
FIG. 2.—Ratio of true air speed (V) to indicated air speed (V_i).

TABLE 3.—CORRECTION FOR ISENTROPIC COMPRESSION (63)

Metric (M) unit of $V = 1$ m/sec; English (E) = 100 ft./sec

V		$\rho v^2/2q$	V		$\rho v^2/2q$
E	M	$= q_0/q$	E	M	$= q_0/q$
1	30	0.998	6	183	0.931
2	61	0.992	7	213	0.907
3	91	0.982	8	244	0.881
4	122	0.969	9	274	0.852
5	152	0.951	10	305	0.822

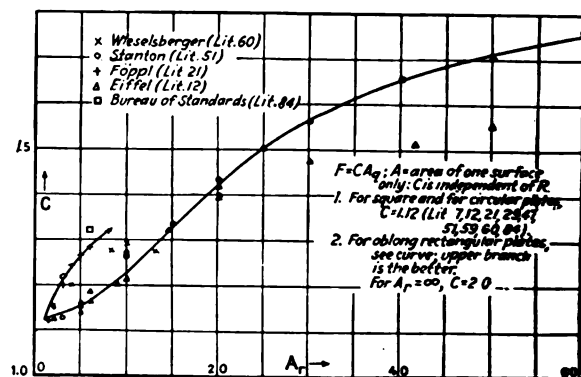


FIG. 3.—Air force: flat plates normal to wind.

TABLE 4.—WIND PRESSURE ON STRUCTURES

Reference plane (see below) is normal to wind. $F_N = C_N A q$;

A = area of projection of object upon reference plane

Unit of $F_N/A = 1$ lb./ft.² = 4.88 kg/m²

Object	C_N	F_N/A^*
1. Long flat plate.....	2	30
2. Square flat plate.....	1.1	16
3. Rectangular prism (1:1:5) (75).....	1.6	24
4. Long cylinder.....	0.8	12
5. Short cylinder.....	0.7	10

* For $V = 76$ mi. per hr (= 34 m. per sec) true speed = 100 mi. per hr recorded by Robinson anemometer.

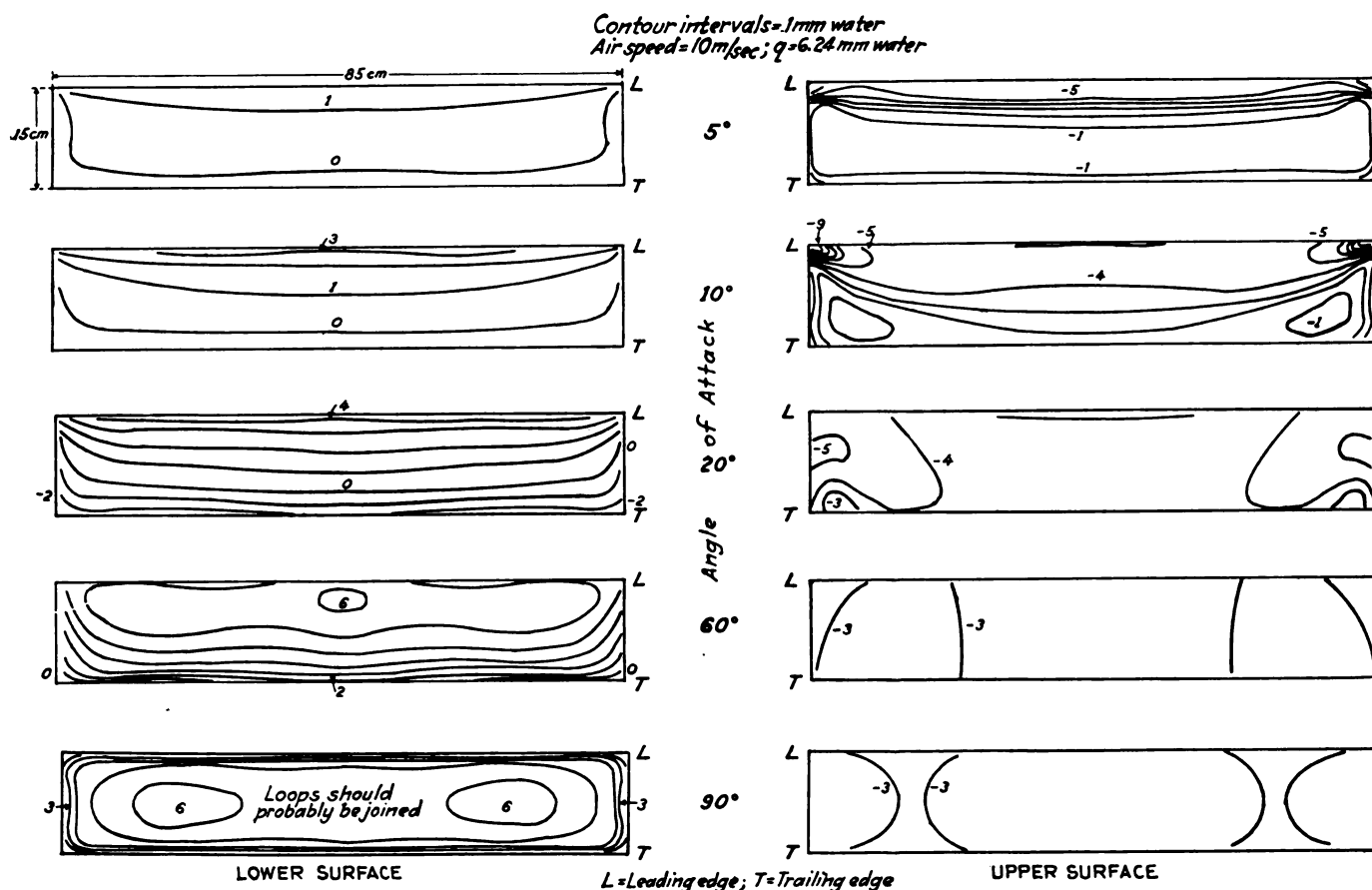


FIG. 4.—Pressure distribution: oblong, rectangular plate, inclined (12, 13).

Wind Pressure on Structures.—One must consider (1) maximum wind speed to which the structure will be subjected, (2) the value of the coefficient C_N , and (3) the effective exposed area. The first and the third depend upon local conditions; in the third, shielding effects are very important. The value of C_N should be determined from observations upon a model of the actual structure, as experiments upon flat plates are of little value for this purpose. Opinions differ regarding whether, in gusty winds, the maximum value of F_N is determined by the average or by the maximum value of V (20, 52). Approximate values of C_N for certain typical cases are given in Table 4, where reference plane for flat plate is surface of plate; for prism, its largest face; for cylinder, the plane through axis and normal to that which contains axis and direction of wind. Object (1) is comparable to such structures as wireless masts and long narrow bridge girders; (2) to thin square signboards; (3) to tall buildings; (4) to chimneys; (5) to cylindrical water tanks.

TABLE 5.—SURFACE FRICTION (F_f) ON THIN FLAT PLATES
(Standard density and viscosity)

$F_f (= \int f dA) = 0.0375 A q R^{-0.16} = F_0 A K_w K_v$ (5, 61) where A = total area (both sides) exposed to air stream, F_0 is a factor depending upon the density and viscosity of the air and upon the units employed, and K_w and K_v are numerical factors determined, respectively, by the width (W) of the plate in the direction of the stream, and by the speed (V). F_0 is independent of the ratio S/W , provided $0.5 < (S/W) < 2$; if $S/W = 30$, F_0 is 10% less than the value given in the table. For effect of roughness (it is great), and for variation of f from point to point see (22, 24, 32, 53, 54, 55, 62).

English units $F_0 = 0.0420$ lb./ft. ² Unit of $F_f = 1$ lb.; of $A = 1$ ft. ² ; of $V = 1$ ft./sec				Metric units $F_0 = 0.0311$ kg/m ² Unit of $F_f = 1$ kg; of $A = 1$ m ² ; of $V = 1$ m/sec			
W	K_w	V	K_v	W	K_w	V	K_v
1	1.413	10	0.014	1	1.000	10	1.000
2	1.273	20	0.051	2	0.901	20	3.605
3	1.198	30	0.108	3	0.848	30	7.633
4	1.147	40	0.184	4	0.812	40	13.00
5	1.110	50	0.277	5	0.786	50	19.64
6	1.080	60	0.389	6	0.764	60	27.52
7	1.055	70	0.517	7	0.747	70	36.60
8	1.034	80	0.662	8	0.732	80	46.85
9	1.016	90	0.823	9	0.719	90	58.26
10	1.000	100	1.000	10	0.708	100	70.80
11	0.986	110	1.193	11	0.698	110	84.45
12	0.973	120	1.401	12	0.689	120	99.19
13	0.961	130	1.625	13	0.681	130	115.0
14	0.951	140	1.864	14	0.673	140	131.9
15	0.941	150	2.117	15	0.666	150	149.9
20	0.901	160	2.386	20	0.638	160	168.9
30	0.848	170	2.669	30	0.600	170	188.9
40	0.812	180	2.967	40	0.575	180	210.0
50	0.786	190	3.279	50	0.556	190	232.1
100	0.708	200	3.605	100	0.501	200	255.2

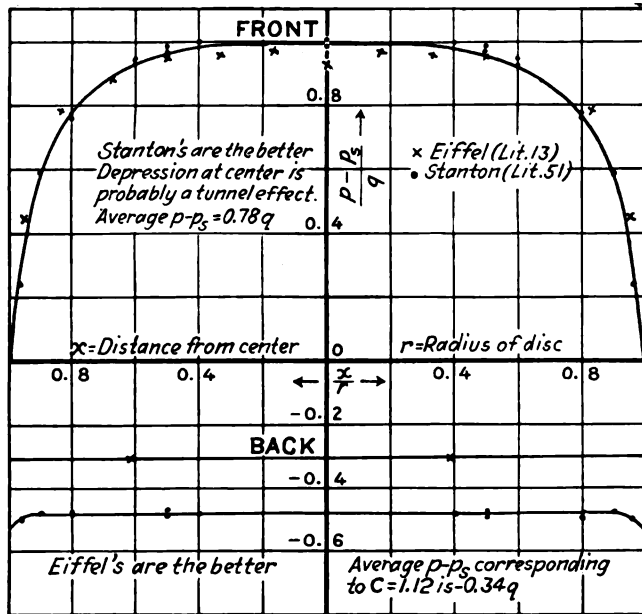


FIG. 5.—Pressure distribution: thin circular disc normal to wind.

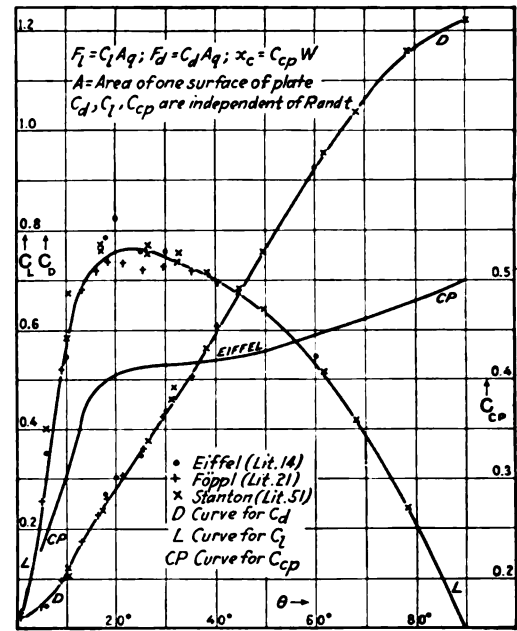
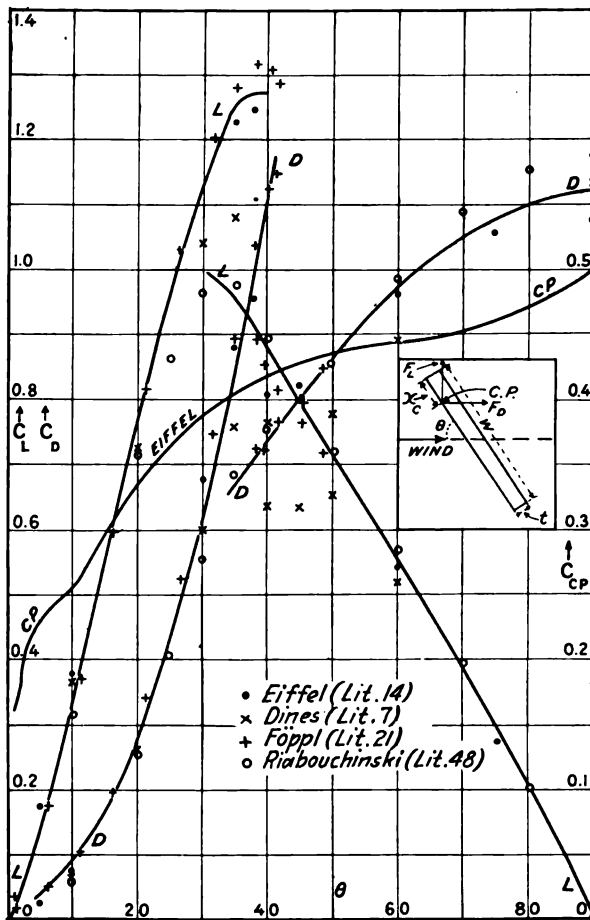
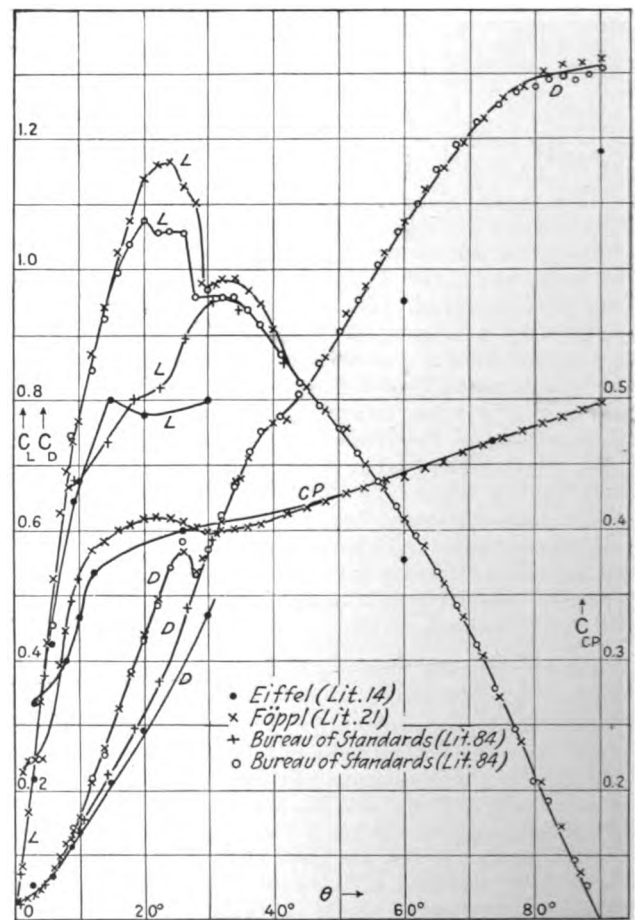
FIG. 7.—Coefficients: inclined, rectangular plates, $A_r = 3$. (See Table 6.)

FIG. 6.—Coefficients: square, inclined plates. (See Table 6; for notation, v. Fig. 7.)

FIG. 8.—Coefficients: inclined rectangular plates, $A_r = 6$. (See Table 6; for notation, v. Fig. 7.)

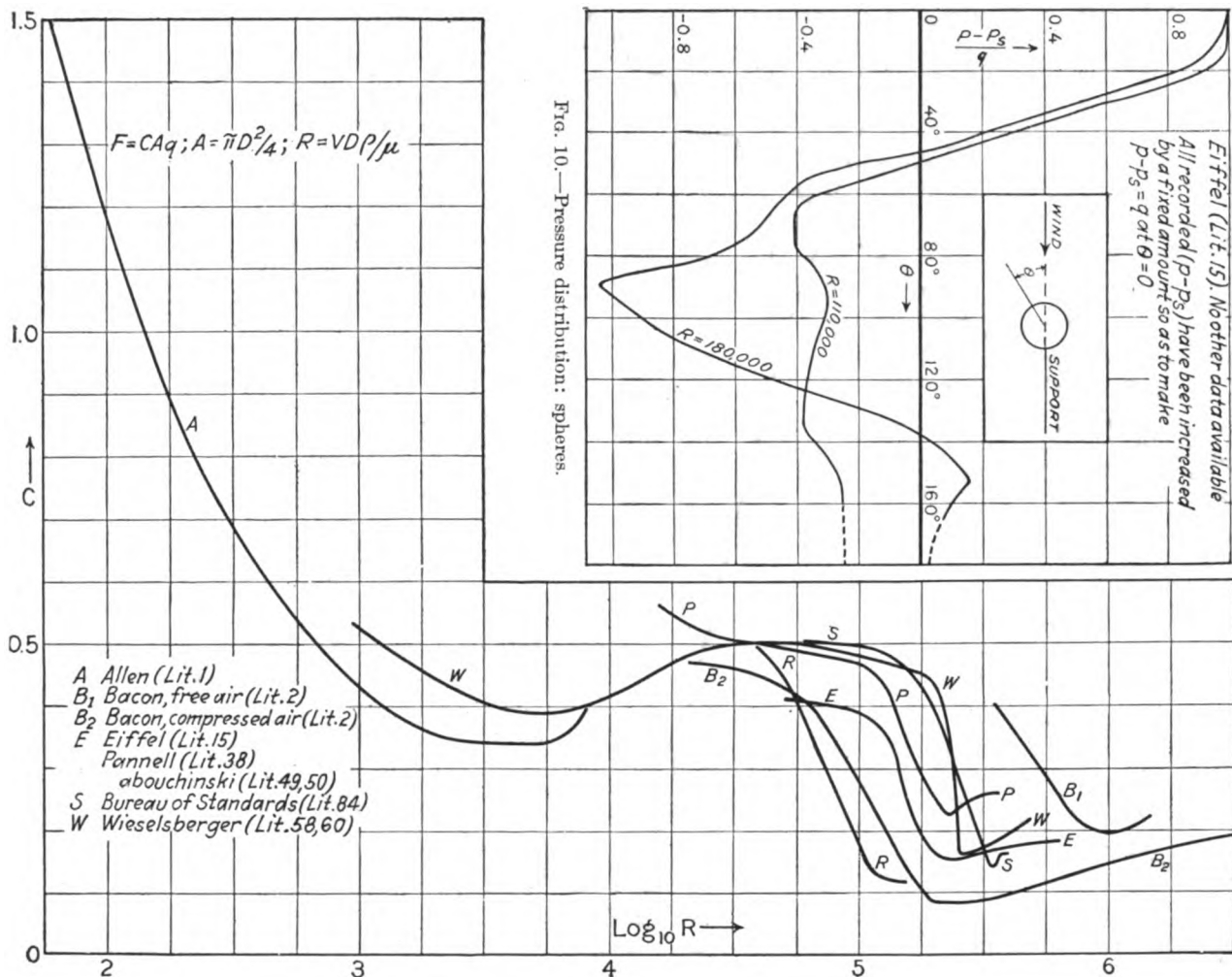


Fig. 9.—Air force: spheres.

TABLE 6.—EXPERIMENTAL DATA; FIGURES 6, 7, 8

Unit of S and W = 1 cm; of t = 1 mm; of TD = 1 m; of R^\dagger = 1000

	Fig. 6				Fig. 7				Fig. 8			
	.	×	+	0	.	×	+	0	.	×	+	0
S	25	30.5	12	12	45	7.6	36	90	30.5	72	30.5	
W	25	30.5	12	12	15	2.5	12	15	5.08	12	5.08	
t	3	3.18	1.7		3	0.25	1.7	3	1.17	1.7	1.29	
TD^*	1.5	∞	2.0	1.2	1.5	0.6	2.0	1.5	1.37	2.0	1.37	
R	210	382	55	42	126	10	55	126	64	55	64	

* TD = tunnel diameter.

† R is dimensionless.

The flow about a sphere is extremely sensitive to slight changes in the method of support, and to the condition of turbulence of the air stream. Changes in C are associated with changes in the locus of the points at which the smooth flow leaves the surface, forming a highly turbulent region to the rear. The location of this locus is determined solely by the irregularities in the air stream, as there are no sharp edges or other geometrical feature which might serve to fix it.

Airfoils.—Aerodynamical characteristics are specified in the same manner as are those of plates. An airfoil's area and angle of attack are conventionally defined with reference to some specified plane. The area of the airfoil is defined as that of its normal projection upon this plane of reference. The length (c) of

the projection upon this plane of any fore-and-aft section of the airfoil is called the chord of that section; it is the unit in terms of which all dimensions of that section are expressed. The form of the section is specified by the rectangular coordinates of points upon its boundary; the choice of axes is immaterial, although usually one axis is in the plane of reference. The aspect ratio (A_r) of the airfoil is defined as the ratio of length of span (S) to length of the chord. In addition to the coefficients considered for plates, the moment coefficient $C_M = M/(qAc)$, and the lift-drag ratio (F_l/F_d) are also of importance.

Data are usually given for $A_r = 6$. If $A_r > 3$, then for a given C_l , $\theta_A = \theta'_A + C_l/\pi A_r$ radians, and $C_d = C'_d + C_l^2/\pi A_r$; θ'_A and C'_d are values of θ_A and C_d when $A_r = \infty$; $C_l/\pi A_r$ and $C_l^2/\pi A_r$ are called the induced angle of attack and the induced coefficient of drag, respectively (25, 26, 42, 72).

For airfoils, C_l increases slightly, and C_d decreases very appreciably, as R is increased; C_{dp} remains unchanged. The difference between the values of the coefficients for airfoils of the size used on aircraft and those for models of the size generally employed in laboratory tests, depends upon the form of the airfoil; for a thin, low cambered section (RAF 15), it is small; for a highly cambered section, it is large.

For the effects produced by placing one airfoil near another, as in a biplane combination see (26, 27, 36, 42, 74).

For a complete airplane, the drag introduced by the body, and the moment of tail lift, both vary appreciably with the size of the airplane (6, 67, 73).

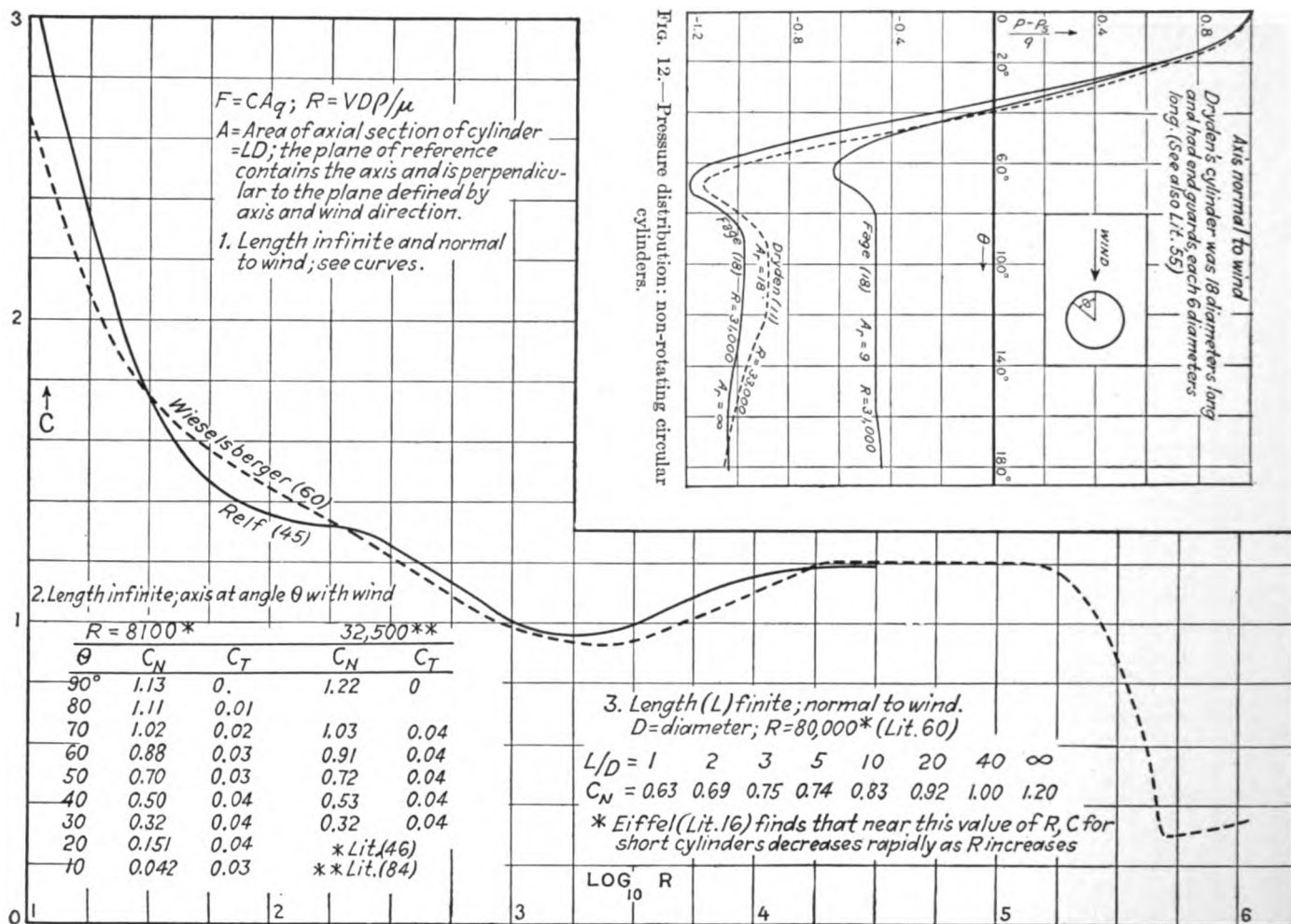


FIG. 11.—Air force: non-rotating circular cylinders.

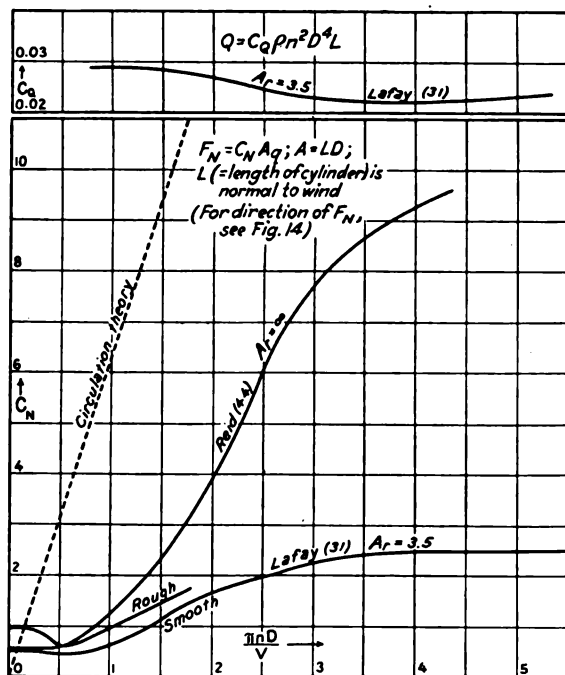


FIG. 13.—Air force: rotating circular cylinders (Magnus effect).

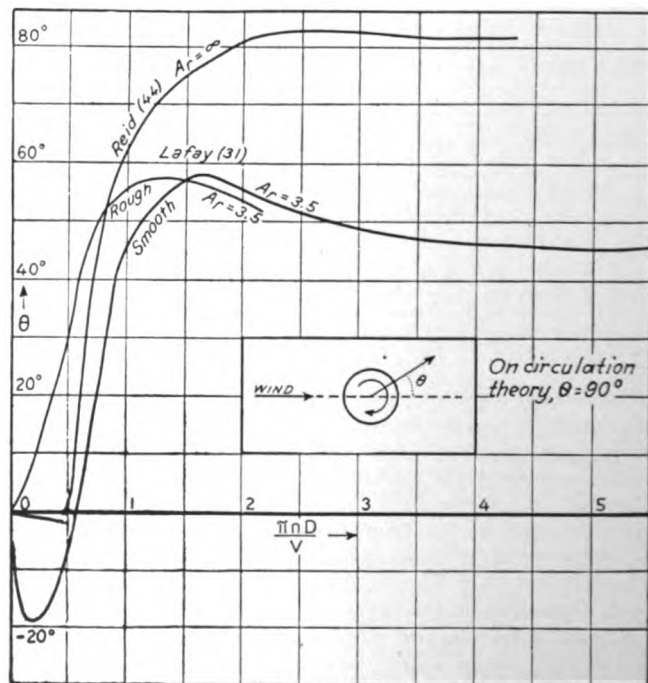


FIG. 14.—Direction of air force: rotating circular cylinders (Magnus effect).

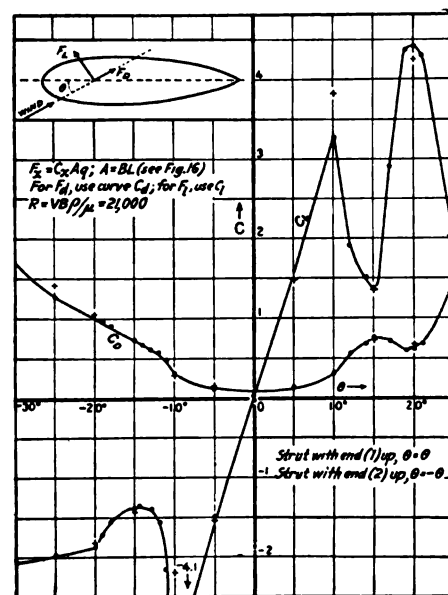
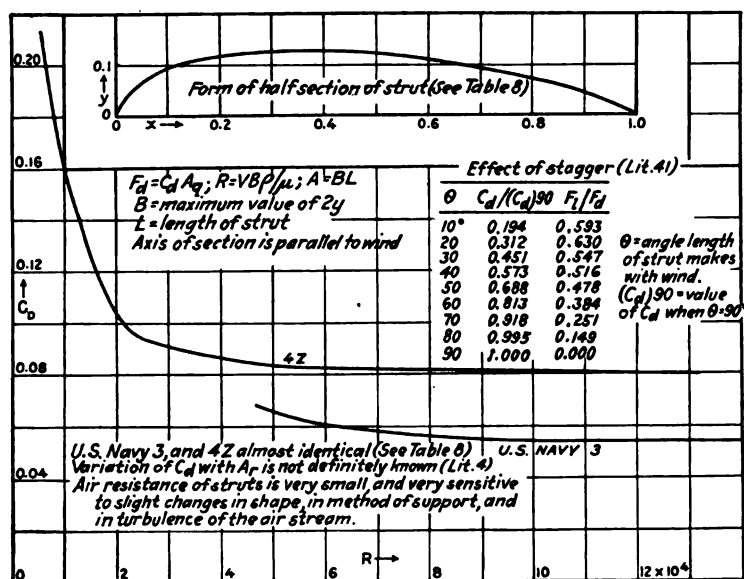
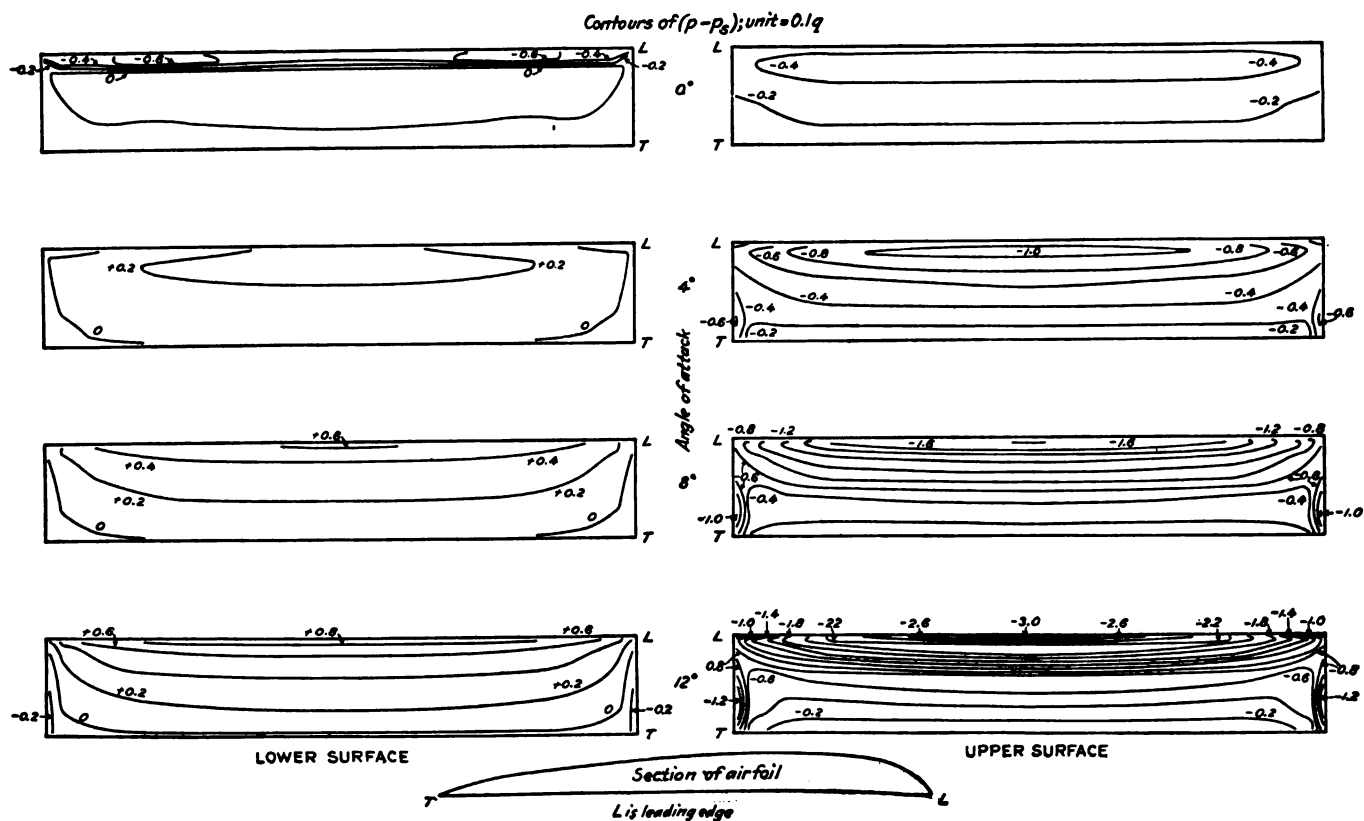
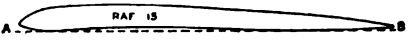



TABLE 7.—CHARACTERISTICS OF AIRFOIL SECTIONS

$A_r = 6$; model 36 in. by 6 in.; $V = 40$ mi./hr; $R(= \rho Vc/\mu) = 181\,000$; tunnel diameter = 7.5 ft. (⁵⁷). θ_A is measured from reference plane AB (see Figs. 22, 23, 24); x and y are rectangular coordinates of points on surface of airfoil (y_u, y_l refer to upper and lower surface, respectively); x is measured in plane AB . Unit of x and of y is 1% of chord. For additional data for these and other sections see (12, 13, 14, 34, 37, 68, 69, 70, 73, 80, 81).

Form			Aerodynamical characteristics						
x	y_u	y_l	θ_A	C_l	C_d	F_l/F_d	x_c/c	C_M	

0.00	0.30	+0.30	 FIG. 22.						
1.25	1.90	-0.35							
2.50	2.85	-0.70	-4°	-0.18	0.025	-7.3	-	-	
5.00	3.95	-1.05	-2°	-0.04	0.014	-2.8	-	-	
7.50	4.65	-1.15	-1°	+0.03	0.013	+2.6	0.966	0.029	
10.00	5.05	-1.20	0°	0.14	0.013	10.7	0.479	0.067	
15.00	5.55	-0.85	1°	0.24	0.013	18.8	0.407	0.098	
20.00	5.78	-0.55	2°	0.32	0.016	20.0	0.367	0.117	
30.00	5.80	-0.10	4°	0.46	0.023	20.0	0.321	0.148	
40.00	5.60	-0.03	6°	0.61	0.033	18.4	0.302	0.185	
50.00	5.23	-0.24	8°	0.76	0.047	16.2	0.297	0.228	
60.00	4.65	-0.50	10°	0.89	0.061	14.7	0.288	0.260	
70.00	4.05	-0.65	12°	1.00	0.083	12.1	0.281	0.286	
80.00	3.30	-0.65	14°	1.02	0.124	8.2	0.298	0.313	
90.00	2.30	-0.30							
95.00	1.68	0.00							
100.00	0.65	+0.34							

0.00	0.00	0.00	 FIG. 23.						
1.25	2.02	-1.65							
2.50	2.71	-2.45	-4°	-0.26	0.014	-	-	-	
5.00	3.67	-3.46	-2°	-0.10	0.012	-8.8	-	-	
7.50	4.47	-4.10	0°	+0.04	0.013	+3.1	0.197	0.008	
10.00	4.95	-4.57	2°	0.18	0.015	12.4	0.224	0.040	
15.00	5.37	-5.27	4°	0.33	0.020	17.2	0.229	0.076	
20.00	5.69	-5.58	6°	0.50	0.028	17.5	0.241	0.121	
30.00	5.32	-5.27	8°	0.65	0.040	16.2	0.242	0.159	
40.00	4.68	-4.52	10°	0.78	0.054	14.6	0.244	0.193	
50.00	3.72	-3.56	12°	0.88	0.076	11.6	0.246	0.220	
60.00	2.61	-2.39	14°	0.73	0.170	4.3	0.234	0.181	
70.00	1.60	-1.44	16°	0.70	0.239	2.9	0.382	0.293	
80.00	0.69	-0.74							
90.00	0.37	-0.43							
95.00	0.16	-0.16							

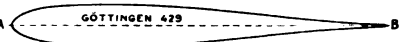
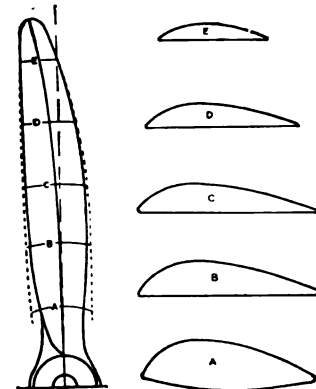
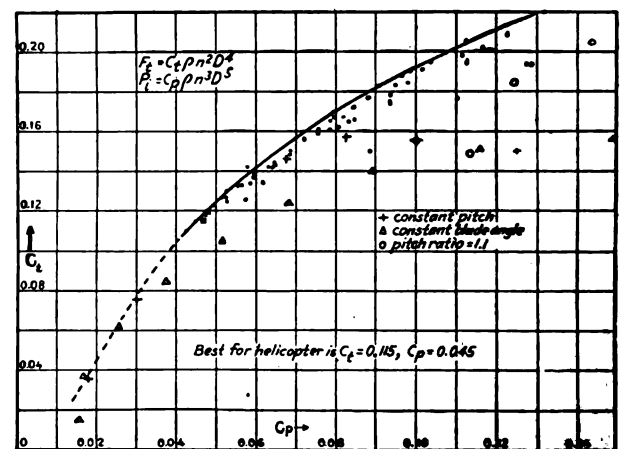
0.00	3.61	3.61	 FIG. 24.						
1.25	6.74	1.35							
2.50	7.98	0.80	-8°	-0.07	0.071	-0.9	-	-	
5.00	9.86	0.35	-6°	+0.08	0.031	+2.6	1.410	0.109	
7.50	11.32	0.18	-4°	0.22	0.024	9.4	0.684	0.150	
10.00	12.40	0.09	-2°	0.37	0.026	14.3	0.507	0.188	
15.00	13.83	0.00	0°	0.51	0.031	16.4	0.436	0.222	
20.00	14.77	0.07	2°	0.66	0.039	16.9	0.396	0.261	
30.00	15.36	0.21	4°	0.81	0.051	15.9	0.369	0.300	
40.00	14.88	0.37	6°	0.96	0.067	14.3	0.348	0.336	
50.00	13.47	0.54	8°	1.10	0.084	13.0	0.337	0.374	
60.00	11.59	0.54	10°	1.23	0.104	11.8	0.323	0.403	
70.00	9.27	0.54	12°	1.33	0.125	10.6	0.307	0.416	
80.00	6.57	0.49	14°	1.42	0.148	9.6	0.312	0.454	
90.00	3.61	0.27	16°	1.43	0.182	7.9	0.315	0.466	
95.00	1.99	0.16	18°	1.42	0.213	6.7	0.327	0.486	
100.00	0.36	0.00	20°	1.41	-	-	-	-	

TABLE 8.—FORM OF STRUTS; U. S. NAVY 3, BRITISH 4Z

(See Fig. 16) (These struts give as small a C_d as any)

Unit = axial length of section

$2y$			$2y$			$2y$		
x	U.S.N.	4Z	x	U.S.N.	4Z	x	U.S.N.	4Z
0	0	0	0.250	0.240		0.700	0.184	0.182
0.025	0.092		0.300	0.247	0.250	0.750	0.164	
0.050	0.132	0.122	0.350	0.250		0.800	0.142	0.142
0.075	0.159		0.400	0.250	0.246	0.850	0.116	
0.100	0.180	0.182	0.450	0.250		0.900	0.085	0.094
0.125	0.197		0.500	0.240	0.234	0.950	0.049	
0.150	0.210		0.550	0.230		1.000	0.000	0.000
0.175	0.220		0.600	0.215	0.212			
0.200	0.229	0.240	0.650	0.201				

FIG. 18.—Durand's F_2A_1, S_1P_1 propeller family. Pitch ratio constant. (Members differ only in pitch ratio.)FIG. 19.—Characteristics of Durand propellers at a fixed point (^{5, 10}).

Elongated stream-line solids of revolution have a small resultant drag, which varies greatly with turbulence of air stream, position of neighboring bodies, and slight changes in form. The area entering into the expression $F = CAq$, is generally taken either as the area of maximum section normal to the length, or as $(\text{volume})^{2/3}$. C varies with the Reynold's number. When $A = (\text{volume})^{2/3}$, the minimum value of C for large values of R , and for bodies which are 4 to 5 diameters long, is of the order of 0.014. When $A =$ sectional area, the minimum value of C is of the order 0.03, and is obtained with bodies shorter than 4 diameters. Their equilibrium when parallel to the air stream is unstable; adding fins gives stability and greatly increases their drag (23, 35, 39).

Propellers.—Propellers are usually divided into families in which pitch-ratio and diameter are the only variables. Blade thickness and outline are usually determined largely by structural considerations; if the average thickness and width of blade are fixed, other variations have small effect upon attainable efficiency (8, 9, 18, 19, 65, 66, 71, 76, 77).

The characteristics of a propeller working at a fixed point may be expressed by two dimensionless coefficients, C_t and C_p , defined by the equations $F_t = C_t \rho n^2 D^4$ and $P_i = C_p \rho n^3 D^5$. For most propellers, there is, between C_t and C_p , a functional relation which is nearly independent of the design, provided large blade angles are not used (33). In Fig. 19, the curve indicates the most favorable results; marked departures from the curve occur mainly with propellers of high pitch ratio, or of constant blade angle.

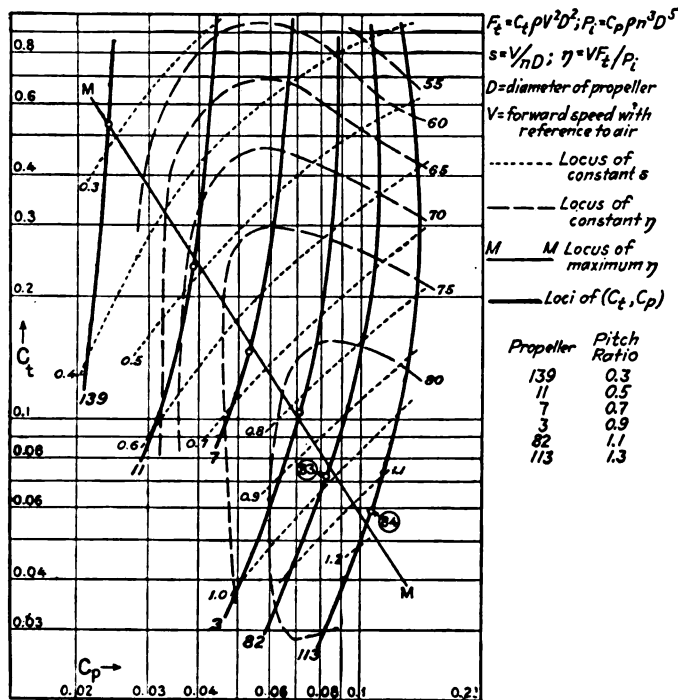


FIG. 20.—Characteristics of advancing Durand $F_1A_1S_1P_1$ propeller family (*).

The characteristics of propellers at various forward speeds (V) and speeds of rotation may be expressed by curves showing the relationships between three parameters. In Fig. 20, the parameters used are C_t , C_p , and s or η , defined by the equation $F_t = C_t \rho V^2 D^2$, $P_i = C_p \rho n^3 D^5$, $s = V/Dn$; $\eta = C_t s^3 / C_p$, and D = diameter of the propeller. Useful range of C_t is 0.05 to 0.25; of C_p is 0.04 to 0.16. Data given are for propellers of two blades; increasing the number of blades, displaces the curves upwards and to the right.

Wind mills.—Quite different principles control the designing of wind mills which derive power from natural winds, and of those (such as the small wind mills used on airplanes for driving fuel pumps, etc.) which derive their power from the motion of a power driven craft. In the former, the controlling factor is the cost per unit of power developed; in the latter, it is the power consumed per unit of power, or torque load, developed.

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(For a key to the periodicals see end of volume)

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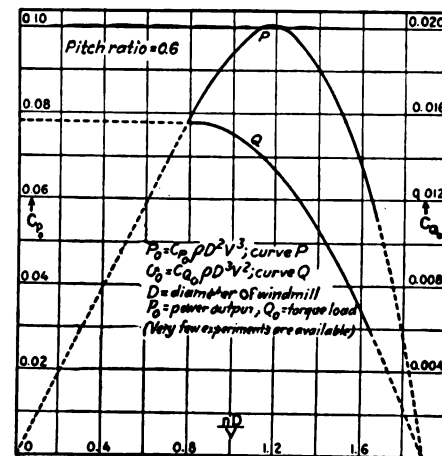


FIG. 21.—Characteristics of two blade windmill (¹⁷).

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